

# Cedar Mountain Landscape Assessment



Prepared by:

Continuing Education in Ecosystem Management Team  
Module XI

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## Executive Summary

The Cedar Mountain Assessment Area is located in Southern Utah approximately 5 miles east of Cedar City. To the south is Zion National Park, to the north is Cedar Breaks National Monument, and to the east is the Dixie National Forest. There are two major watersheds in the Analysis Area, the Virgin River Drainage in the southern portion and Coal Creek River Drainage in the Northern portion. The assessment area is approximately 122,000 acres in size and was described by one of the early settlers as “a sylvan paradise” (McConnell 1962). There is one major road that runs through the area from Virgin Utah to Highway 14 just east of Cedar City. This road is maintained by both Washington and Iron Counties. The assessment area encompasses three different counties Iron, Washington, and Kane County. This assessment describes the past, present, and future trends of the community and contains information on the social aspects and natural resources of the area. The report also identifies opportunities to influence those trends and resources that may be of assistance to local landowners.

A majority of the Cedar Mountain area is owned by private landowners including sheep ranchers, cattle ranchers, homeowners in developments, and a small portion of BLM and State lands. As land use continues to change this creates a very unique environment for potential conflicts on the future condition of this area.

The analysis team identified three predominant themes during the review: 1) aspen decline in the area, 2) development impacts to the local area, and 3) changing demographics.

The assessment found that the ecosystem has changed from historic conditions. Absence of fire and long-term grazing has affected current conditions of aspen, and it is probable that the aspen will continue to decline in the absence of management intervention. Pressure to develop and subdivide agricultural lands will continue as the demographics shift from rural to urban characteristics.

Long term management is needed in order to restore and maintain the aspen ecosystem. Opportunities exist between the private landowners and state and federal agencies to collaborate on many different issues to help sustain the ecosystem. The analysis team has developed a compilation of potential opportunities and possible resources that includes: partnerships, uniting landowners with common natural resource goals, non-traditional economic sources, and finally, opportunities for developing and disseminating critical information.

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## Introduction

Continuing Education in Ecosystem Management (CEEM) is an annual continuing education course where natural resource professionals from federal and state agencies receive six weeks of classroom courses with leading forestry, watershed, range, wildlife, economic, and social science academic staff at Utah State University, Northern Arizona University, and Colorado State University. The course work focuses on current information about physical (such as water, air, fire, wood production), biological (such as vegetation, fish and wildlife, rare species, invasive species), and social (such as community interactions, recreation, and economic) topics as they relate to public agency land management on a landscape scale. The course culminates in a two-week on-site landscape assessment project selected from agency requests. The Cedar Mountain Assessment allowed the CEEM group the opportunity to apply the principles and theories they had learned by completing a practical assignment on a landscape.

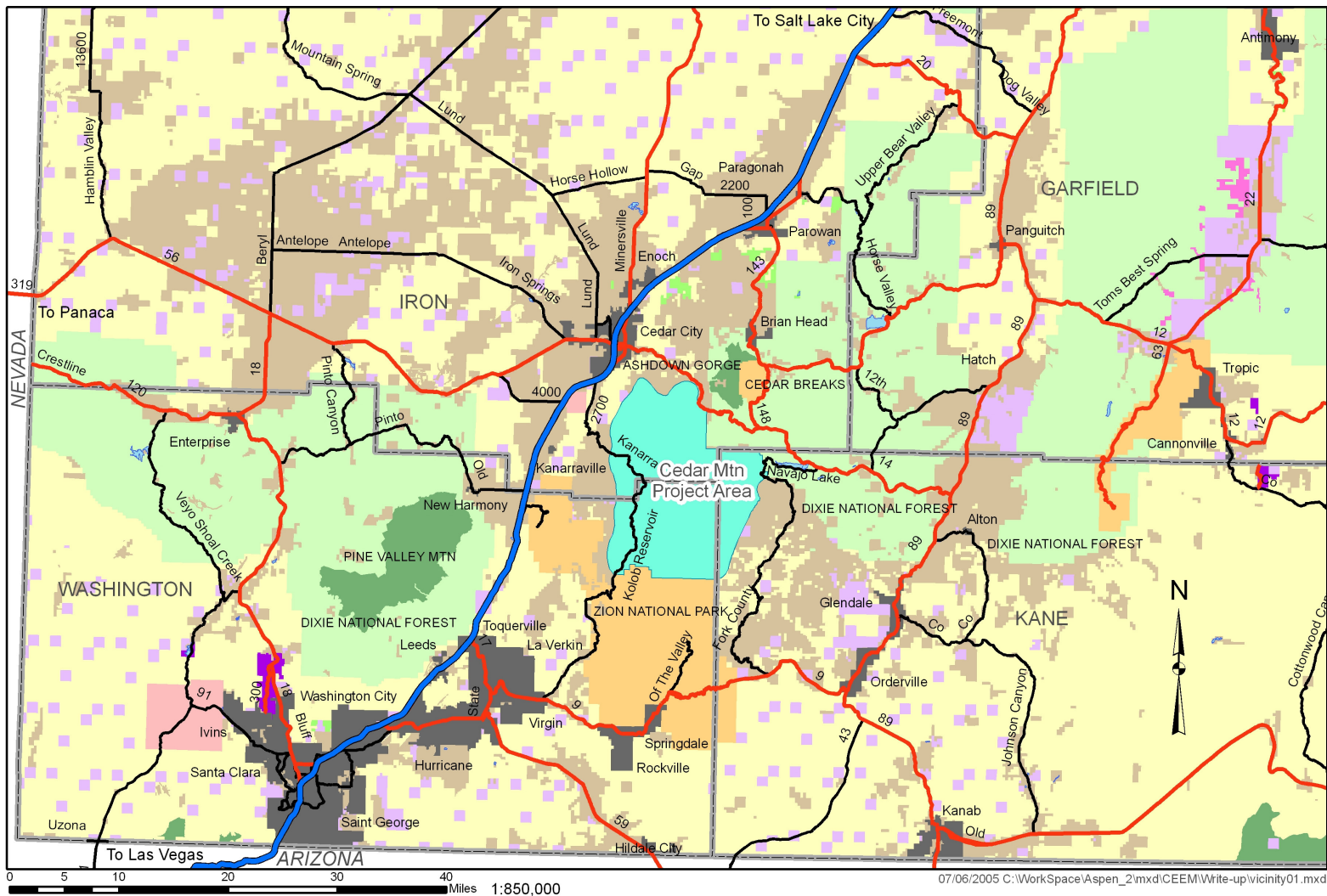
The team was asked by Southern Utah University professor Jim Bowns, Utah State University extension specialist Chad Reid, and State of Utah Area Forester Clint Reese to look at land management issues on Cedar Mountain. Our assessment and this document provide a “big picture” view of the ecosystem and the interactions with landowners and adjacent communities of interest.

The team came to know the area through field tours and interviews with state and federal agency representatives and key informants. All sources were freely used as reference material and are cited and acknowledged in the references section of this report. In addition to the interviews, we gathered physical, social, and biological information from various databases and GIS sources. The assessment synthesized the gathered information into 3 themes: 1) aspen management, 2) changing demographics, and 3) increasing development.

A combination of fire suppression and grazing have reduced and/or eliminated the disturbance component in the aspen type, contributing to a decline in aspen.

Changing demographics in the Cedar Mountain Assessment Area, as in many rural areas throughout the western United States, is not only changing land use patterns from agricultural to residential, but are shifting attitudes about the land and its uses. Continued development in the area brings pressure on owners of the remaining large, agriculture lands to develop their property. Good planning for future land-use is becoming critical.

Opportunities exist between the private landowners and state and federal agencies to collaborate on many different issues to help sustain the ecosystem. The analysis team has developed a compilation of potential opportunities and possible resources that includes: partnerships, uniting landowners with common natural resource goals, non-traditional ways to keep the land, and finally, opportunities for developing and disseminating critical information.



**Figure 1. Vicinity map of the Cedar Mountain Landscape Assessment.**

# Chapter 1: Social Assessment

## Demographics

### **History of Land Use in Iron, Washington, and Kane Counties**

The Utah Centennial History information (Utah Centennial 1999) was referred to frequently for this section

#### The First Inhabitants

Peoples have lived in southwestern Utah for 8,000-12,000 years. Anasazi and Fremont peoples were the first formative societies in Utah, and southern Utah was later inhabited by the Southern Paiutes. Several bands of the Paiute peoples lived peaceably on the landscape from approximately a.d. 1300 to times of white settlement. The Paiutes roamed the high plateaus of the assessment area, moving seasonally from the mountains to central areas in the winter. They were marginally agricultural and highly dependent on the natural resources surrounding them.

Spanish explorers brought horses to the landscape and surrounding tribes, and by the mid-1700's the Ute peoples used horses to expand their range into Paiute territory. The Spanish trade routes through Utah resulted in a reduction of Paiute Tribes. By the time Mormon pioneers arrived the Paiutes were dispersed and only had a minor presence. Today the Paiute bands have a small reservation south of Cedar City but no longer roam the plateaus of Cedar Mountain.

#### Euroamerican Settlement

A series of acts passed beginning in the mid-1800's, including the Preemption Act of 1841, Homestead Act of 1862, Townsite Act of 1867, Married Person's Property Act of 1872, Timber Culture Act of 1873, Desert Entry Act of 1877, Enlarged Homestead Act of 1909, and Toc Raising Homestead Act of 1916, paved the route for legal land ownership in southern Utah. The Homestead Act of 1862 was of particular importance on the assessment area, allowing both women and men to file a claim for land (Warnick 1985). This act had no requirements of permanent, year-round residence on the land.

Cedar Mountain had no settler residents until 1869. Despite fears of Indians and wild animals, the need for cattle feed drove the first dairying families from Cedar City to the mountains. The move proved worthwhile as settlers discovered that upon the mountain "untouched beauty and bounteous feed were overwhelming" (McConnell 1962). For these predominantly English, Welsh and Scottish descendants, the summer months meant the women would make butter and cheese, while the men would work on the farms in the valleys below the mountain. Children worked to herd cows to pastures, feed them and milk them. Each family could produce 60-75 cheeses (30-40 pounds each) and 2-3 ten gallon kegs of salted butter (85 pounds each). The hills of grasses, aspens and woodlands



were found habitable April through October, after which the winter climate would force residents down to lower ground (McConnell 1962).

Sheep were brought to the mountain late in the 1800's. Sheep ranchers found success in both the wool and lamb meat businesses. Wool was originally spun and weaved into clothes for the community by women, but as herds grew, the market was expanded to other states. Groups such as the Cedar City Cooperative Sheep Association (1869) and the Cedar City Cooperative Cattle Company (1875) were essential in the early days. Cooperative herding helped protect the cattle and split the resources and work load. The original groups did not last, however, ending in small battles over the equity of land and animal distribution/use.

Cooperative associations were replaced by interest groups such as the Cedar Livestock Association (1907) and Utah Cattlemen's Association (originally part of the Livestock Growers Association of 1870, next becoming the Utah Horse and Cattle Growers Association in 1890, and finally gaining its current name in 1956, Utah Cattlemen's Association). The sheep industry largely replaced cattle on the landscape by 1900 because as sheep tend to clip grass closer to the ground, they leave little forage available for cattle. The sheep industry peaked between 1910 and 1930, when 190,000-200,000 sheep were said to roam the hills. Overgrazing abuse was in time mitigated through government regulation, beginning with the conservation policies developed by Gifford Pinchot (US Forest Service) and President Theodore Roosevelt. These changes included the reduction of the grazing season, limiting the use of grazers to permits, and permitting many small land users at the expense of big operators. Also the introduction of higher quality stock, including Hereford cattle and Rambouillet sheep, reduced the need for large numbers of livestock grazing the landscape.

The Depression quickly followed this prosperous time, and like the rest of the world during the 1930's, farmers and ranchers in southern Utah were economically devastated. A drought during this time further aggravated the problem. Bad markets for wool and meat, drought, and overgrazing all contributed to a great reduction of sheep on Cedar Mountain.

The farmers and sheepherders survived this period, however, and despite occasional market failures and economic problems, have continued grazing in the family business through the present. Although the dairying industry faded out in the early part of the century, many of the original families that claimed the land during the Homestead Act still graze sheep and beef cattle on Cedar Mountain during the summer months. Development pressure has caused some landowners in the last 20 years to sell and subdivide lots but the mountain is still very much rural and entrenched in its historical uses.

## **Today's Users of Cedar Mountain**

### Large Lot Landowners

The vast majority of Cedar Mountain acreage is currently owned by a small number of families who graze sheep or beef cattle. Sheep are more commonly grazed than cattle due to their ability to eat tall larkspur, a plant poisonous to cattle. Sheep grazers are also able to take advantage of two markets—wool and lamb meat. Most of these families have passed the land down to family members since the land was acquired and grazed sheep during the majority of this period. Their long history of grazing on the mountain has given them strong connections to the land and the desire to keep it undeveloped.

Most landowners are aging, and due to changing markets for land and agricultural products, the future of the land lies uncertain. Though most owners want to keep the land in the family indefinitely, many of their children have moved to non-ranching professions or are tempted sell the land due to soaring real estate prices. The younger generations may want to keep the land within the family but may not be able to do so because of their non-agricultural profession, decreased agricultural markets, and increased costs of grazing (partially attributed to increased population growth in the area).

Owners that have acquired the land more recently use grazing as a secondary profession or source of income. These people appreciate the land and history but may not be dependent on it economically. There is a general desire to keep the land undeveloped in this group, though some owners in this group are taking advantage of the real estate markets and are subdividing portions of their land.

Grazing is the primary use of the land for this group of people, though family gathering, recreation and hunting are also significant uses. Use of this group is concentrated in the summer when grazing occurs. Winter use is restricted because there is no winter road access.

### Small Lot Landowners

This is a mixed group of people generally owning less than 5 acres of land. A significant portion of the small lot owners have owned the land for many years (two of our interviewees had purchased the land over 30 years ago, while one contact had land in the family since the Homestead Act) and plan to pass it on to their children or relatives. Most are from southern Utah (St. George or Cedar City) while others are from other states, primarily Las Vegas, Nevada. Other small lot owners have purchased land more recently, particularly as subdivisions grow and are being developed. Increasingly, these lots are purchased by people who live in urban centers in Nevada, California and Arizona. These people use their homes seasonally, with high use in the summer and growing winter use with snowmobiles.

Structures on Cedar Mountain have traditionally been cabins with few utilities. Generators provide electricity, springs provide water (or people haul it from their homes) and snow limits access to roads seasonally. Interviewees expressed little interest in

enhancing utility services, though some thought their children may be interested in improvements. Most do not care to see the landscape change and want to keep the area rural. The most recent developments on the west side of the mountain nearest Cedar City have permanent residents with gas, electricity, year-round road access, and water tanks. Some homeowners there have expressed interest in services such as road pavement and garbage pick-up.

Family gathering is the most important use for the seasonal land owners. Recreation, ATV riding, fishing, firewood collection, cattle grazing, and wildlife watching were other uses cited. Hunting was not a mentioned use and some animosity toward it was detected in several interviews. Many homeowners belong to neighborhood associations that work on typical community concerns including road maintenance and utilities. Other groups have formed to graze land collectively within a neighborhood or, oppositely, to fence entire subdivisions in order to keep sheep out.

A final group of small lot land owners include those that have no cabin on the land and lease the land for grazing or keep the land for investment purposes. Small lot owners are divided on their opinions of increasing development. Most land owners prefer the landscape to remain unchanged and view further subdivisions as a problem. However, an increasing number of residents are sympathetic to development, being part of it, benefiting from it, or having strong feelings for the protection of private property rights to manage their land as desired. Most view lot sizes of 1-5 acres as acceptable development but negatively view subdividing land into lots less than 1 acre.

Fire is considered a threat by many, and a small proportion of people are aware of fuel reduction measures. Most neighborhood associations have fire plans though not all members are aware of or care about the details. Increased land taxes, decreased quality of outdoor experiences due to an increased number of people, roads being blocked by aspen falling over, grazing animals on their property, and insufficient stocking of fish in the reservoir were other cited concerns of small land owners.

### Non-profit Organizations

There are several children and adult camps on Cedar Mountain. The Church of Latter Day Saints and the Boy Scouts of America, Las Vegas Council collectively own over 2000 acres. Children are the primary users of these camps, with occasional adult groups. The land serves these groups as a setting for outdoor education. Firewood is collected on-site and camps are occasionally used for winter recreation including snowmobiling and cross-country skiing. Fire is a concern for camp owners and they are actively managing fuels. Dense pockets of pine are of particular concern and increased timber harvests to reduce fuels are desired. Grazing and hunting are not allowed on camp lands. Some attribute healthy aspen reproduction to the lack of grazing. These landowners do not want to develop the landscape, and some indications show a desire to acquire more land and connect properties.



## Land Ownership Patterns on Cedar Mountain

Data for this section were derived from the latest Iron, Kane and Washington tax record databases.

Cedar Mountain is unusual in the west in that it is a high elevation forest/woodland that is almost entirely privately-owned. Approximately 106,000 acres within the Cedar Mountain project boundary are private lands, and 16,000 are owned by the state or federal government, 80% of which belongs to the Bureau of Land Management. The area is encompassed by three counties: Iron County containing approximately 50,000 acres, Kane County containing 20,000 acres and Washington County containing 52,000 acres. Refer to the map in Appendix B-1.

Nearly 90% of the land is owned by Utahans (Figure 2), primarily from Cedar City, Salt Lake City, St. George and Hurricane, Utah (Figure 3). Other people owning large land sections live in Nevada, California and Arizona, containing 8%, 2% and 1% of the land respectively (Figure 2). The majority of landowners in the area are still largely from Utah, though the contrast is less stark at 63%, compared to the percentage of out-of-state owners at nearly 37% (Figure 2). Indeed, the majority of acres are owned by families having over 500 acres (62%), primarily Utahans, whereas 61% of the total owners have 5 acres or less (1% of the total land base). See Figure 5 for distribution of owners by land holding size.

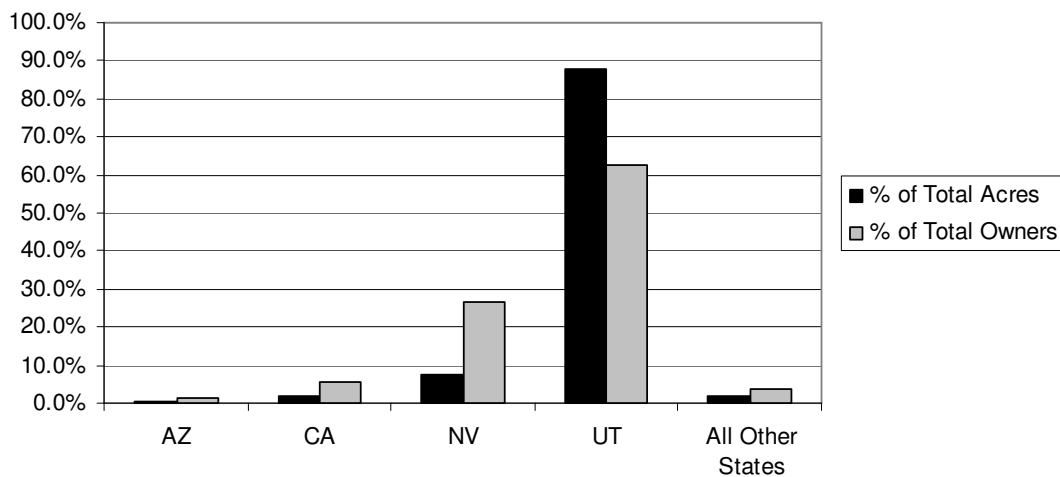


Figure 2. Percent of total acres and percent of total number of owners by state.

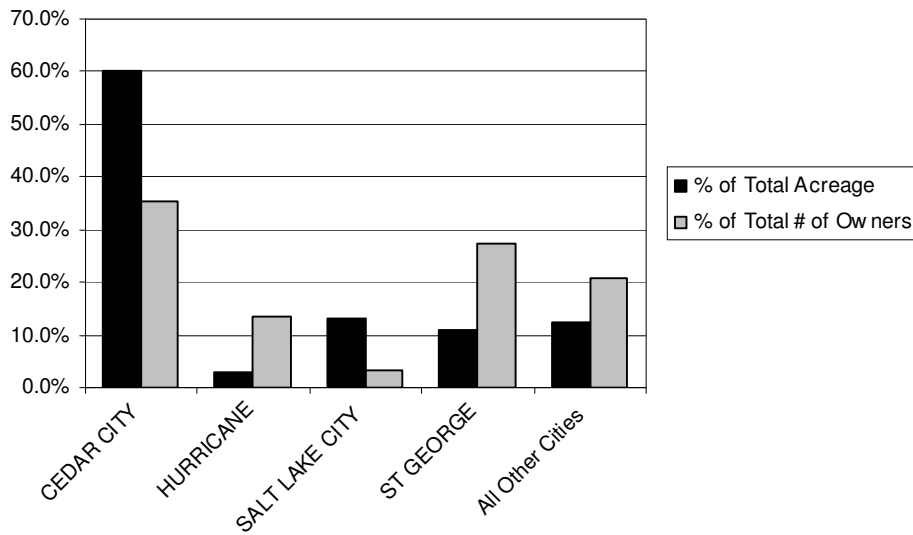


Figure 3. Percent of total acres and total number of owners by Utah City.

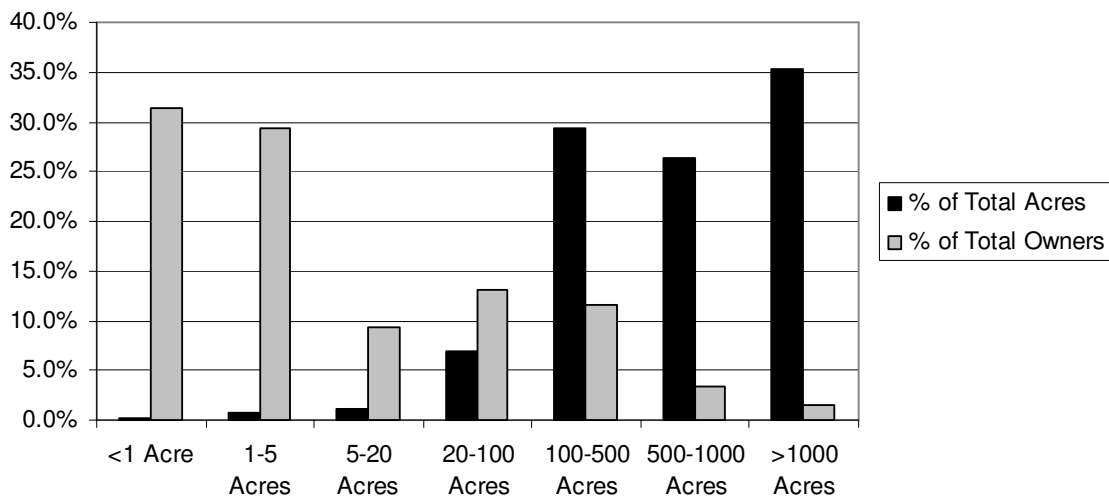


Figure 4. Percent of total acres and total number of owners.

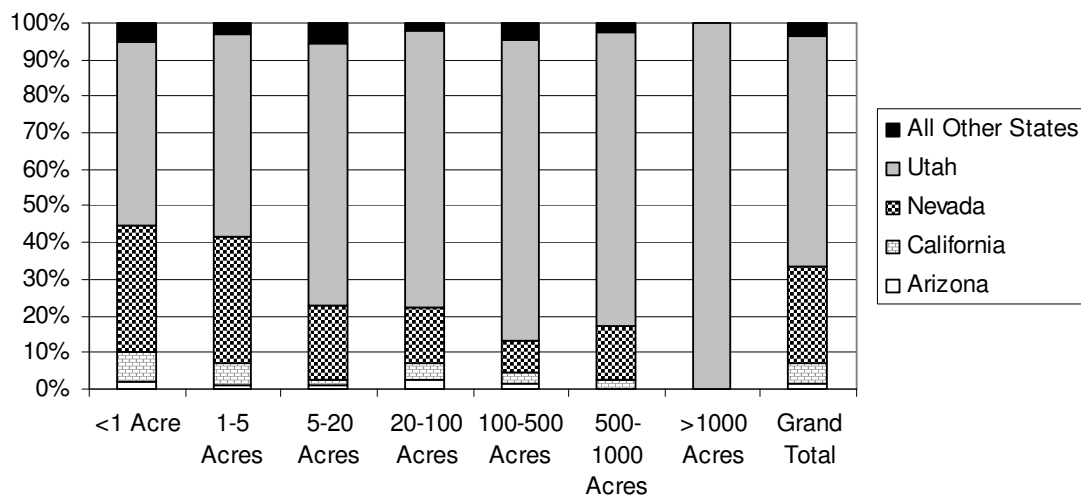


Figure 5. Percent of ownership by state.

### Counties within the Cedar Mountain Assessment Area

The Cedar Mountain Assessment area encompasses land in Iron, Kane and Washington counties of southern Utah. The great majority of these counties are rural, due to the presence of abundant public lands (Utah State is comprised of approximately 80% public lands) and a long-term agricultural history. The current conditions and trends for each county are addressed below:

#### Iron County

Iron County's population surged in the 1990's, posting the third-highest growth rate in Utah. The growth was influenced by expansion in the light manufacturing sector, a broad and balanced economy, and the accreditation of Southern Utah State College, in 1991, now Southern Utah University. Over the last thirty years, the mining, agriculture and government sectors have decreased, while services and business proprietors have increased. Southern Utah University is currently the largest employer in Cedar City, the county seat. Cedar City is a regional trade center and supplier of services with a diversifying population. The high population and employment growth are expected to continue over the next twenty years. In response, the County developed an urban growth boundary to direct new growth to areas closest to cities. Water is an issue of significant concern as the county has endured several consecutive years of drought. Second-home ownership is also a concern for community leaders as the implications of these demographic changes are uncertain.



### Kane County

As Kane County's reputation as a retirement and lifestyle community grows, older segments of the population are expected to continue rapid growth. Tourism and recreation on surrounding public lands provides substantial income to the county's economy. Critical water supplies and access to coal and aggregate resources are viewed as potential sources of growth, but are often limited by land-use policies beyond local control. Many Kane County leaders have long expressed interest in utilizing resources on public lands for economic development. Kane County does not provide municipal level services to unincorporated land. This is intended, in part, to retain the qualities of a rural setting. Kane County has also established a Water Conservancy District to manage water supply, which could be a limiting factor on growth. Affordable housing has become scarce, particularly for service-sector employees, and land-use planning is on the agenda for the county.

### Washington County

Washington County has been the fastest growing county in the state for the past decade, with projections to continue on this path. This is in part due to the growth of Las Vegas as well as retirement and in-migration for lifestyle reasons. It is the most urban county in southern Utah, and most closely resembles the economics of northern Utah. Tourism and winter residence recreation have economically changed the county since the 1960s. Agriculture has decreased significantly in recent years, being replaced by trade, transportation, utilities and services. There is general interest to maintain agriculture as a small but viable industry, and as a result community members have worked to protect open spaces as an economic development strategy that also enhances tourism. The water supply will prove to be a limit to growth unless new water sources are developed. The Water Conservation District supports the opportunity for improved management and developments to increase water quality and quantity.

### **Changing Demographics of Cedar Mountain Counties**

Iron and Washington counties are experiencing extreme growth (Table 1), with Iron County seeing a 62% growth between the 1990 and 2000 census and Washington County undergoing an 86% growth rate. Most of this growth is occurring near the county seats, Cedar City and St. George, and surrounding towns. Kane County too is growing in population, though growth is checked, probably due to its isolation and being surrounded by public lands. An estimated 60-70 percent of people that moved to these three counties between 1995 and 2000 were from the same county, and approximately 30-40 percent came from other Utah counties or states (Table 2).

Table 1. 1990 and 2000 Population data for Iron, Kane and Washington Counties (from 2000 Census data).

County	2000 Population	1990 Population	% Change
Iron County	33,779	20,789	62%
Kane County	6,046	5,169	17%
Washington County	90,354	48,560	86%
Total	130,179	74,518	75%

Table 2. Percent change of residence from 1995 to 2000 from the same county, from a different county in Utah and from a different state (from 2000 Census data).

County	% Moved from Same County	% Moved From Different Utah County	% Moved from Different State
Iron County	63%	18%	17%
Kane County	69%	12%	18%
Washington County	66%	16%	17%

Median home prices are lowest in Kane County (\$103,900) and highest in Washington County (\$139,800) according to the 2000 census. Most (50-60%) of the homeowners that lived in the three counties in 2000 moved in since 1995, and 25-30% of the owned houses were built in this time period as well (Table 3). Local realtors estimate properties comparable to Cedar Mountain one-acre lots (no home) to sell for \$15-30,000. A local homeowner estimates lots slightly larger than one acre in her neighborhood, Cedar Highlands, would cost approximately \$100,000.

Table 3. Median home value, rent, percent of homes built before and after 1995, and the percent of homeowners that purchased their homes before and after 1995 (from 2000 Census data).

County	Median Home Value	Median Rent Per Month	% Homes Built Prior to 1995	% Homes Built Between 1995-2000	% Homes Purchased Prior to 1995	% Homes Purchased Between 1995-2000
Iron County	\$112,000	\$468	75%	25%	38%	62%
Kane County	\$103,900	\$406	80%	20%	51%	49%
Washington County	\$139,800	\$594	70%	30%	38%	62%

Iron County has the youngest population, with an average age of 24 years old, compared to Kane County's 39 years and Washington County's 31 years (Table 4). Thirty to forty percent of the population of each county consists of people under the age of 20 (2000 census). Approximately one fifth of the population is college educated, the median household income ranges between \$30-40,000 per year and the unemployment rate for each county sits around 5 percent (Table 5).

Table 4. Median age and percent of population younger than 20 and older than 65 years of age (2000 Census data).

County	Median Age	% Greater than 20 Years Old	% Greater than 65 Years Old
Iron County	24	37%	9%
Kane County	39	32%	17%
Washington County	31	35%	17%

Table 5. Community well-being statistics in Iron, Kane and Washington Counties.

County	% College or Higher Education	% Unemployment in Civilian Labor Force	Median Household Income	% Individuals Below Poverty Level
Iron County	24%	5%	\$33,114	19%
Kane County	21%	5%	\$34,247	8%
Washington County	21%	6%	\$37,212	11%

Though the majority of the land is tied to agricultural use, the farming/fishing/forestry sector employs the least number of people, ranging from 0-2 percent (Table 6). Management/Professional careers make up the majority of the jobs in these counties, followed by sales/office work, and then by service positions (2000 census).

Table 6. Percent of population in differing occupations in Iron, Kane and Washington Counties.

County	Management/ Professional	Service	Sales/ Office	Farming/ Fishing/ Forestry	Construction/ Extraction/ Maintenance	Production/ Transportation/ Material Moving
Iron County	28%	16%	29%	2%	13%	13%
Kane County	29%	18%	24%	1%	15%	12%
Washington County	27%	18%	28%	<1%	14%	13%

## Planning and Zoning Concerns

Forty-seven interviews were conducted to assess planning and zoning concerns for the Cedar Mountain Assessment Area, primarily in-person, and secondarily by telephone. Questions were asked about their thoughts on water use, planning and zoning, desired future services, aspen issues, future challenges to the communities and the future of the large, agriculturally-managed land parcels. Interviewees included local community leaders (County Commissioners, Planning and Zoning, Roads and Bridges, Emergency Services,), State Agencies (Utah Division of Forestry Fire and State Lands, Division of Wildlife Resources), Federal Agencies (Forest Service, National Park Service, Bureau of Land Management, and Natural Resource Conservation Service), Cedar Livestock

Association, Iron County Cattle Association, non-profit camps (Boy Scouts, LDS Church), local realtors, local sawmill operations, developers, large landowners, and small lot landowners.

### Water

The surveys indicate planning and zoning is a concern for many people. With the rapid growth increase in Iron and Washington Counties, the issue of water and water rights concern everyone. At the present time, land parcels are sold as dry lots and land developers are required to provide water and septic systems.

For water rights, all water is fully appropriated, so no new appropriations will take place. Trans-basin transfers are not allowed. Inter-basin transfers are allowed if they don't incur the effect of a new appropriation. An inter-basin transfer is hydrologically connected and must use an existing appropriation and priority date.

Iron County has had an established Water Conservation District since 1996. Diminished water supplies and a lowered water table, coupled with the increase in population and irrigated croplands has highlighted the need for better water management.

Kane County has established a Water Conservancy District to manage water supply, which could be a limiting factor on growth. Several studies have determined that there is no indication that current groundwater withdrawals have had any significant effect on the amount of groundwater in storage, and groundwater discharge and recharge are approximately in balance basin-wide over the long term, but there is substantial uncertainty about exactly how groundwater flows, and the effects of Lake Powell on groundwater.

The Water Conservation District in Washington County supports the opportunity for improved management and developments to increase water quality and quantity and would like to implement conservation pricing. The current water supply will prove to be a limit to growth unless new water sources, such as Lake Powell or converting agriculture water to municipal and industrial use, are developed.

### Planning

High population and employment growth are expected to continue over the next twenty years in Iron County. The County has developed an urban growth boundary to direct new growth to areas closest to cities in response. Sound public lands management is also a concern, particularly with fire and noxious weed management. Cooperation, communication, and coordination of local, county, and area leaders is a stated goal of county planning and the County Plan makes it clear that they consider federal agencies to be "area leaders", with an influence on the future of their community.

Kane County does not provide municipal level services to unincorporated land. This is intended, in part, to retain the qualities of a rural setting. Affordable housing is also becoming a prominent issue, particularly for service-sector employees. Kane County

Commission has expressed its intent to become a proactive partner in all public lands planning processes which impact the county land base.

Washington County is actively working to better organize public lands holdings through consolidation and trades and is striving toward an ongoing, working relationship with those Federal and State land agencies. There is a substantial amount of private lands that are near, adjacent to, or within forestlands and managing the urban interface is becoming a critical issue. Transportation infrastructure is also in need of improvement, with a new airport being planned and a pressing need for new roads to continue residential and business growth.

#### Year-Round Service

Secondary homes are taxed at a higher level than primary homes, which is a good revenue enhancement for the counties. More secondary homeowners want to access their homes year-round and the demand for year-round services is increasing. The only service the counties provide for the area is maintaining the road (except in the winter).

#### Wildland Urban Interface

In the Cedar Mountain area, there are two completed Fire Plans. One is the Cedar Highlands Plan and the other is the Camp Kolob Plan, which is located at the north end of Zion National Park. In addition to these two plans, a third plan may be completed in the Kolob Terrace area, which includes all the development around Kolob Reservoir and adjacent areas.

Homeowners are very concerned about fire. There has been some work accomplished through fuels reduction in the areas with a Fire Plan. This work consists of thinning, brush cutting, chipping and piling on individual lots. Residents are aware of the concepts of fuels reduction and the need for having defensible space. Permanent residents are interested in improving their defensible space while non-residents don't seem concerned.

The Federal agencies are interested in promoting Wildland Urban Interface (WUI) programs in the Cedar Mountain area. The Cedar Mountain area has a Wildland Urban Interface Coordinator, through Forestry, Fire, and State Lands, working with the landowners.

#### Aspen

In general, the public seems to be unaware of the aspen decline in the Cedar Mountain area. People believe there is no market for aspen and the interest for pursuing aspen products is almost non-existent. County officials believe that an education program on aspen would be beneficial for landowners in the area.

### Future Challenges

Water and land development are the two biggest challenges the Cedar Mountain area will face in the future. Other future challenges to highlight include: Wildland Urban Interface, pressure for increased services, emergency services in remote locations, Federal agency regulations, environmental issues, additional land acquisitions, balance of economics and resources, maintaining winter and summer range, increased recreational use, and wildlife management.

The interviewees were divided on whether they thought future generations of large landowners would keep the land in the family or sell the land for subdivisions.



## Water History

The Utah Centennial History information was referred to frequently for this section (Utah Centennial 1999).

Iron County's pioneer settlements were established wherever water was available from mountain streams or free-flowing springs. The first communities were located on Center and Coal creeks because they drain the largest watersheds and carry the most water. Water for culinary and irrigation uses have dramatically changed in recent decades but are still crucial to the quality of life of Iron County residents.

Coal Creek has its source in the mountains east of Cedar City and was Cedar City's main source of irrigation and culinary water for the first fifty years.

Before stone coal was discovered floating in the creek in the spring of 1851, it was known as Muddy Creek or the Little Muddy. A cloudburst or even a light rain makes its water distinctly muddy, and the location of the storm determines the water's color. Red water comes from the brightly colored cliffs of Cedar Breaks; reddish-brown or chocolate-colored water comes from the mountainsides, especially from Maple Canyon; water with a milky appearance comes from the gypsum beds and the soils of the gray and tannish hills. Floods can carry as much as 86 percent suspended material, clay, sand, and gravel, after a storm.

The waters of Coal Creek have been appropriated for beneficial use by Cedar City Corporation and the farms in Cedar Valley. As the population increased and more land was taken up for farms farther away from the main fields, applications for water rights increased and conflicts arose which could not be settled easily by negotiation. The adjudication of the waters of Coal Creek was a long, drawn-out process, and one not resolved amicably among the landowners but in the courts. Due to conflicting claims, the Fifth District Court issued a decree in 1901 which established four classes of water based on dates of claims (ex: irrigation, domestic).

The Utah State Engineers Office was established in 1903 and immediately began a determination of water rights for all streams in the state. Between 1917 and 1924 this was accomplished for Coal Creek. A new decree was issued in December 1924 which adjusted the 1901 decree. In February of 1936 the district court made minor adjustments in the 1924 decree, which remained in effect through the 1990s.

Water runs through irrigation ditches throughout the community; it is used less often for home gardening than in the past but is enjoyed by the children as it has been for generations. For almost fifty years, culinary water ran down small ditches. Everyone had a barrel next to the ditch. Each morning the barrels were filled before the animals were turned out and taken to pasture. Families strained the water through canvas bags to filter out some mud and small animal life so "that it could be drunk without chewing". Typhoid fever was common during this time, and town leaders came to realize the danger of drinking ditch water. Every year when the floods came down the canyon there would be an epidemic of typhoid fever, with several fatalities.

Two bonds started the water system that has been continually upgraded, improved, and enlarged by addition of new sources of water. A 900,000-gallon reservoir built in 1925 failed because it was built on gypsum soil. In 1935 WPA funds were used to construct a smaller reservoir of 467,000 gallons, and in 1938 an additional bond provided funds to purchase the water from four major springs at the head of Shirts Canyon, which is piped to tanks on the hill.

After a severe water shortage in 1950, a 2-million-gallon tank was built south of town. Shares in the waters of the Kolob Reservoir were purchased in 1955, as the city council sought to develop water reserves for future growth.

City officials determined that water on the west side of Quichapa Lake represented the only undeveloped groundwater in the area. Cedar City Corporation was granted water rights and the first Quichapa well was added to the system on 23 July 1960. There were at that time four storage reservoirs with a capacity of 4.9 million gallons with two separate 1-million-gallon steel tanks under construction.

During the 1960s, the city drilled a second well in the Quichapa area and a well near the cemetery which waters the cemetery, golf course, and ball parks

In almost one hundred years, the water system for Cedar City has gone from the diversion of Coal Creek to a widespread and multiple-source system. Since 1956 the annual water use has gone from 660 million gallons to over 1,605 million gallons, as the city has grown from barely four square miles to 15.38 square miles and 98.27 miles of water mains.

Coal Creek is the only major stream in the Cedar/Beaver Basin that does not have a large water-storage reservoir to regulate flow fluctuations. Its unique watershed characteristics include a short, steep drainage that lacks adequate vegetative growth to inhibit high sediment runoff. Of ten potential reservoir sites listed in the Utah State Water Plan for the Cedar/Beaver Basin, one is on a tributary of Coal Creek. A reservoir would store 5,000 acre-feet of water as carry-over storage during wet years and help level out year-to-year supplies, but it could negatively reduce the flow of water into Coal Creek and decrease the recharge of the Cedar Valley groundwater aquifer. It remains to be seen if this will be developed.

The mountains east of Cedar City drain into Cedar Canyon, Fiddler's Canyon, Dry Canyon, Green's Lake, and Squaw Cave. It is not surprising that storms over these areas have caused great damage and are the biggest local natural disasters. One of the most devastating floods to hit directly in Cedar City came on Thursday, July 26, 1956, following a cloudburst on the face of the Cedar Mountain at Green's Lake. Floodwaters crossed U.S. 91 and followed an old swale through the west side of the city, damaging homes from 450 West to 1400 West. The city engineering crew rushed ahead of the three-foot-deep flood warning people to get their children inside, as the flood rushed through the streets and yards and into the basements of homes.

In 1958 the Green's Lake Watershed Project was built. A series of three basins were built along the foothills to catch floods and carry the water around the city. On Saturday and Monday afternoons, August 17 and 19, 1958, nearly three inches of rain fell, making virtual rivers of Cedar City streets. Sixty acre-feet of water was diverted on Saturday and a hundred acre-feet of water on Monday by the project, which functioned perfectly in its first real test. Floods in Coal Creek itself often result in deposits of fine sediments in low areas, natural channels, borrow pits, canals, ditches, culverts, and irrigation structures. The fine red sediment washed off the sandstone in Cedar Breaks and Ashdown Gorge usually makes fields unfit for further cultivation.

In 1961 there were eighteen floods reported in the Cedar Canyon drainage. Most were small, but considerable effort was required to keep bridges, irrigation systems, and roads cleared and repaired. On August 3, a large red flood occurred. It originated in Cedar Breaks and the water carried so much sand and clay that it would hardly run, yet pressure carried it almost to Quichapa Lake.

Sediment and debris completely filled Salt Creek where it is crossed by U-14 up Cedar Canyon in August of 1965.

In 1968 the worst of several floods that summer originated in Maple Canyon on August 8<sup>th</sup>. It was a "black flood," indicating that the sediment included coal. The flood washed out Utah Highway 14 at the Maple Canyon bridge. All channels in the valley were filled with gravel and considerable damage was done to farmlands.

In 1969, two of ten large floods were the largest and dirtiest in recorded history. The peak discharge on July 23, 1969 was 4,660 cfs. Just five days later, another flood carried large amounts of timber which jammed bridges.

When snowpack is high, the spring snowmelt recharges underground water reservoirs, or aquifers. There are three large areas in Iron County where groundwater can be pumped for irrigation. The first wells were dug late in the nineteenth century by a new generation of farmers who were moving away from their parents' irrigated farms to establish themselves. Settlers found flowing wells in the lower parts of the valleys when they first drilled in the 1890s and early 1900s.

The biggest push to drill wells came during the drought of 1933 and 1934. State drought-relief committees drilled and equipped six large irrigation wells in Cedar Valley. Each well could produce 600 gallons of water per minute, or approximately 100 acre-feet of water every day.

The county extension agent became concerned that the water table would be lowered by the pumping, so he made monthly measurements of twenty-one wells in 1934. His observation was that the water table was significantly lower.

At present, the U.S. Geological Survey regularly measures the groundwater resources. Observation wells are measured regularly and analyzed at intervals.

The arrival of the Rural Electric Association into the valley in 1945 and 1946 gave great impetus to well drilling. Electric motors allowed for greater pumping capacity and the desert began to blossom. In the 1930s and 1940s, storage ponds were built on the land near each well and all farms used flood irrigation.

Aluminum pipes were introduced in the 1950s and sprinkler irrigation began. By the 1960s sprinkler pipes were put on wheels; the first pivot sprinkling systems was installed on the Moyle farm in the spring of 1966.

Use of geothermal water occurs southwest of Newcastle in the nursery industry. A well, drilled to a depth of 500 feet, supplies water at a temperature of 250° F. Large greenhouses, built in the 1980s, use this geothermal water for heat and raise potted plants and flowers. Another well provides water to heat the local LDS church building.

Groundwater levels declined from 1990 to 1995 in most areas of Cedar Valley, the declines probably resulting from less precipitation and stream flow during the extended dry years of 1990–94. Precipitation was up during 1994 and early 1995, but drought returned in 1996.

In the early 1990s, the Utah Division of Water Resources studied in depth the water resources of the Cedar/Beaver Basin, one of the state's eleven water resource areas. Recommendations were given to county and city governments to work toward conserving and protecting from contamination all water resources, but especially those groundwater basins which are primary aquifers. Groundwater resources in Parowan Valley, Cedar Valley, and the Beryl-Enterprise area are being used (discharged) in greater quantities than they are being replaced (recharged).

The danger exists that if mining of groundwater continues, the cost of pumping for irrigation could become prohibitive in this area. Another potential impact may be to up drainage natural water sources (seeps, natural springs, and streams) as well drilling occurs. As development moves out of the valley and into the plateaus, there is a potential for natural water sources to become affected.

Although water quality is generally good, deterioration in area groundwater quality has occurred. The state recommends that local government entities and water users make protection of recharge areas a part of zoning and management plans.

## Chapter 2: Vegetation

### Fire

#### Historic Fire Conditions

Historical fire prior to European settlement is evident in the analysis area. However these fires likely occurred only during the driest of years. It is cited that Native Americans may have had a large influence on past fire practices. Since the arrival of early settlers in the mid 1800's and the introduction of livestock the number and frequency of fires has been greatly reduced. Generalized natural fire regimes for different vegetation types are displayed in (Table 7).

Table 7. Generalized natural fire regimes for modeled vegetation types.

Fire Regime Class	Frequency (Fire Return Interval)	Severity	Modeling Assumptions
I	0 – 35+ years, Frequent	Surface/Mixed	Open park-like, savannah, or mosaic forest, woodland, or shrub structures maintained by frequent surface or mixed severity fires; surface fires typically burn through a forest understory removing fire intolerant species and small size classes and removing < 25% of the upper layer, thus maintaining an open single layer overstory of relatively large trees; mosaic fires create a mosaic of different age post-fire savannah forest, woodlands, or open shrub patches by leaving > 25% of the upper layer (generally < 40 hectares (100 acres)). Interval can range up to 50.
III	35 – 100+ years, Infrequent	Mixed	Mosaic of different age post-fire open forest, early to mid-seral forest structural stages, and shrub or herb dominated patches [generally < 40 hectares (100 acres)] maintained or cycled by infrequent fire that removes < 75% of the upper layer. Interval can range up to 200.
IV	35 – 100+ years, Less infrequent	Replacement	Large patches (generally > 40 hectares (100 acres)) of similar age post-fire shrub or herb dominated structures, or early to mid-seral forest cycled by infrequent fire that removes > 75% of the upper layer. Interval can range up to 200.
V	100-200 years, Rare	Replacement	Large patches [generally > 40 hectares (100 acres)] of similar age post-fire shrub or herb dominated structures, or early to mid to late seral forest cycled by infrequent fire that removes > 75% of the upper layer.

Many portions of the analysis area have a very short fire season due to high elevation and retention of snow into the late spring combined with the monsoon season that begins in mid July. According to information obtained from a recent study, many of the aspen

clones are between 119 and 145 years old (Ohms 2003). This also supports the idea that fire has not been a major disturbance factor on Cedar Mountain for many years.

Much of the lower elevation has a more frequent fire return interval due in part to lower precipitation and different fuel types such as pinyon-juniper and oak shrub community. In addition the ponderosa pine areas to the East and South may have also had more frequent fires.

More recently, during the past 32 years, 99 fires have occurred (Figure 6) from human and natural causes (Figure 7). Of these fires only 10 have been greater than 10 acres (Figure 8). The largest of these fires was the Big Wash fire, which occurred in 2002 and was 5,284 acres. This fire was aggressively suppressed due to the fear that it might burn into an area recently killed by spruce beetles. It may have been in the past that these fires, if left to burn naturally, would have carried into the aspen stands and would have been intense enough to affect these stands and start the regeneration process. Some speculation has occurred as to whether or not the Big Wash fire may have been able to regenerate some of the aspen clones that are declining on Cedar Mountain had it not been suppressed.

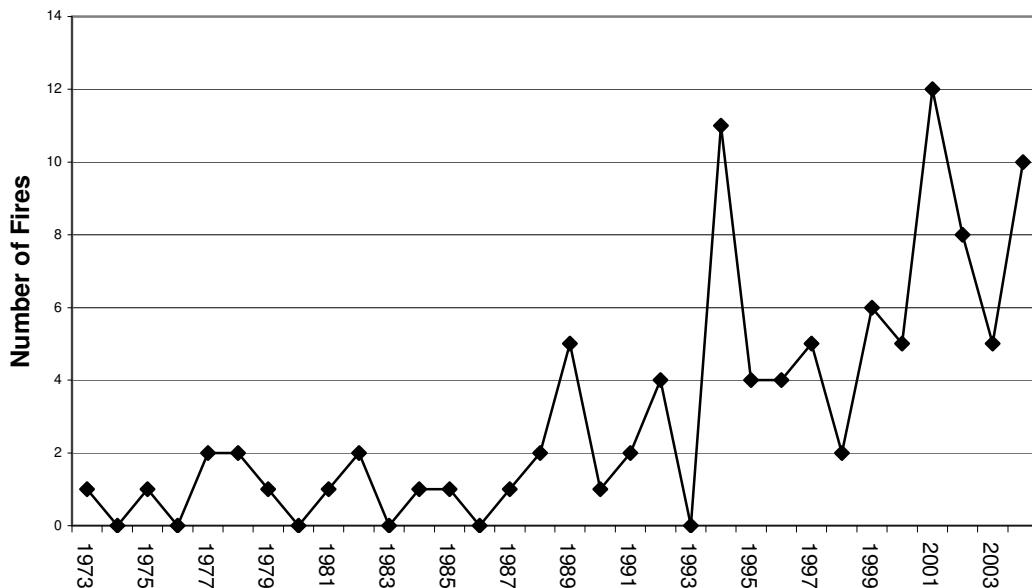


Figure 6. Number of fires on Cedar Mountain 1973-2005.



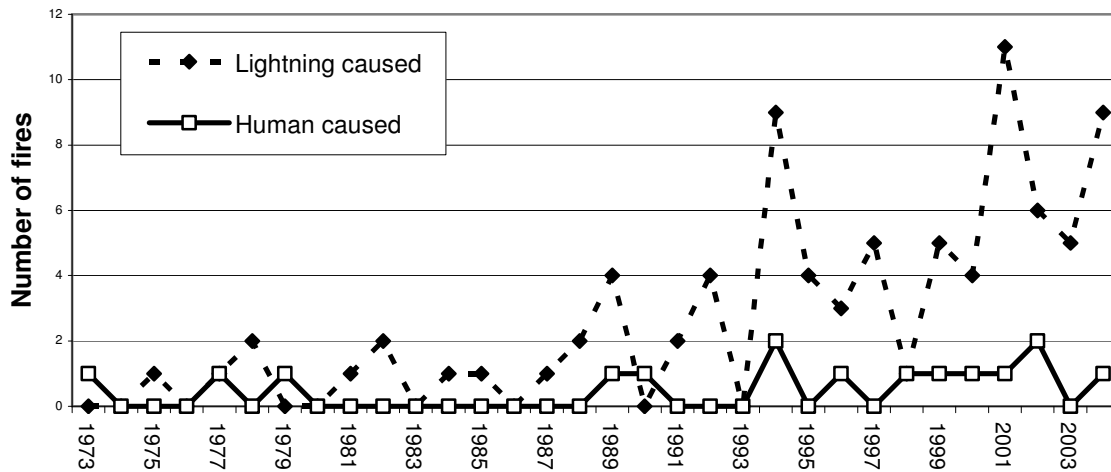


Figure 7. Causes and number of fires on Cedar Mountain 1973-2005.

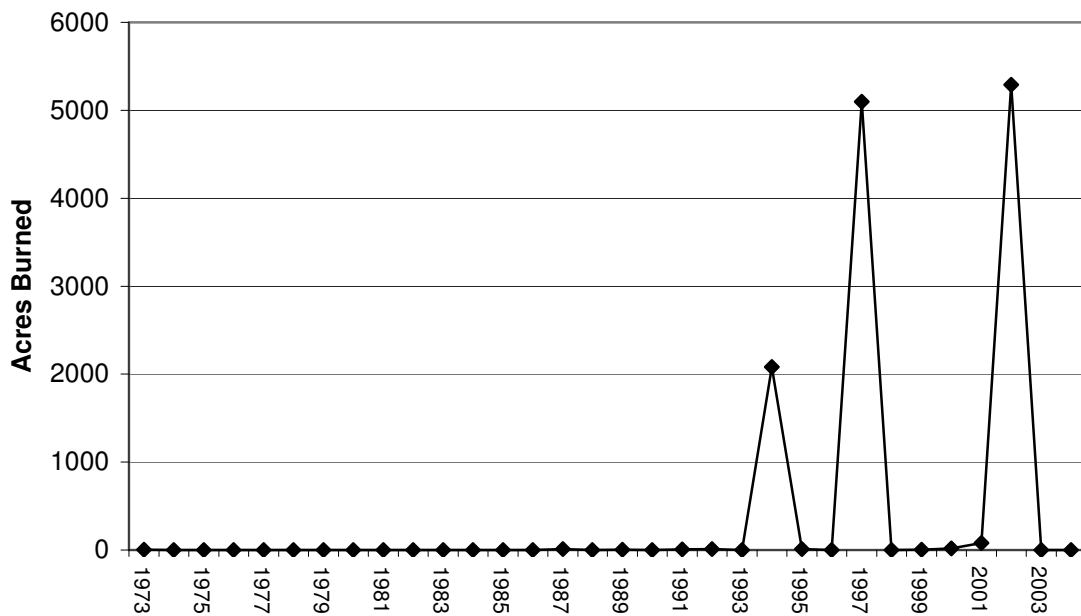


Figure 8. Number of acres burned on Cedar Mountain 1973-2005.

Before and during the mid-nineteenth century, fires were apparently more frequent, and larger acreages of quaking aspen and quaking aspen-conifer mixes burned, than any time since. A large majority of the aspen stands in Jackson Hole, Wyoming, date from fires between 1850 and 1890. In central Utah, Baker (1925) and Meinecke (1929) found few aspen fire-scarred later than 1885. Earlier fire scars were common and showed a 7 to 10 year fire frequency. Since aspen is fire-sensitive, the fires were probably of low severity. Extensive sampling of aspen in Colorado found few fire scars dating later than about 1880. This data indicates that there has been a great reduction of fire rejuvenation of

aspen in the West since about 1900. Extensive young stands of aspen are uncommon in the West. Conifers now dominate many seral aspen stands. Probable contributing factors are:

- highly effective direct control of wildfires in the last 50 years, especially in the aspen type,
- reduction of fine fuels in aspen/grass and aspen/forb types due to grazing, and
- cessation of deliberate burning by Native Americans.

The past decade of drought has had an impact on the moisture regime for this area and along with the current grazing practices and limited stand-replacement fires may influence the ability of the aspen to regenerate naturally.

Although the role of fire has diminished over time, some of the landowners that the team interviewed remember igniting fires behind them as they took their sheep and cattle off the mountain in the fall.

### **Current Fire Conditions**

As mentioned previously, many of the areas on the upper plateau have had little or no recent influence from fire. One of the reasons why fire has been less frequent in this area is due to the fire suppression efforts over the past 100 years. In addition, grazing practices over the past 150 years has reduced or eliminated many of the forb and shrub components that would help carry and sustain a fire through the aspen clones. Aspen stands today are composed largely of aspen stands with a grass understory that if ignited would burn too quickly and would not be hot enough to regenerate aspen.

With increasing development, the challenge of protecting homes and cabins from wildland fire will increase. The Cedar Highland development has approximately 150 home sites. Of these sites approximately 60 are primary and secondary homes or cabins. This specific development has a fire plan and is working in conjunction with the Utah Division of Forestry, Fire and State Lands (FFSL) to reduce the fuels around the homes. In addition to Cedar Highland there are approximately 10 more developments in the analysis area. Camp Kolob, a youth camp located at the north end of Zion National Park, is the only other area that has a fire management plan. This summer FFSL will be developing a fire management plan for Kolob Terrace. This plan will encompass the entire area of Kolob reservoir and the surrounding developments. They hope to have this plan complete by the summer of 2006.

Fuels in the area vary depending on the location. On the upper plateau the fuel loadings are much lower than they were historically due to the grazing. In the steep areas of the lower canyons fuels have seen an increase due to fire suppression and lack of grazing on this terrain. Some of the large fires that occurred in the late 1990's burned many of the lower elevation canyons in the area.

Typically, leaf drop and autumn precipitation coincide, making fall burning difficult. If September and October are dry, however, burning may be possible. Surface fuels are

dead and sometimes frozen, with a continuous layer of loosely packed leaves, making aspen more flammable than at any other time of year.

At first appearances it looks like prescribed fire is an option that should be considered. However, with the grazing regime on the mountain, prescribed fire may not be a viable option without some changes in management. Within the late successional stands of aspen, the vigor and age along with the lack of a carrier for fire, make it difficult for fire to carry through the stands during the early or late season to influence or regenerate the stands most in need of treatment. Season long grazing practices, and removal of the understory of vegetation, precludes fires from growing to any size under current conditions.

## Range

### Historic Range Conditions

According to historical documents the grazing use of Cedar Mountain did not begin with the settlement of the area. There were initially very few cattle and sheep in the area. As time went on the settlers built their herds and began looking towards the Cedar Mountain area for more forage for their livestock. The first cattle on the mountain were a herd of Red Durham dairy cattle put on the mountain in 1869. The following years saw more dairy cattle and 28 families moving in the summer months to the mountain. The women and children were usually left there for the summer to milk the cows for butter and cheese while the men of the family worked farms or other jobs in the valley. Between Cedar Mountain, “the plains”, and the “lower herd” area to the south, there were approximately 550 head of dairy and beef cattle. Movement to the mountain generally started in April or May and they came off in late September or October back to the valley floor except for the beef animals that moved into “the lower herd” area where they wintered.

The first sheep on the mountain were in the early 1880’s with a flock of about 1,000 head that were owned by several owners. In 1869 the Cedar City Cooperative Sheep Association formed with 62 owners and 2,184 sheep. By 1879 the numbers had grown to 5,000 head. This association continued to grow until it was disbanded in 1917 with a number in its flock of 35,000 head. The Forest Reserve Act of 1905 had an impact on grazing on federal lands as it restricted the type and amount of livestock allowed to graze and assigned these rights to specific individuals. This was relaxed during World War I and World War II to increase the amount of meat production. Records show that between 1910 and 1930 there were between 190,000 and 200,000 head of sheep in Kane, Washington and Iron counties during part of the year. Most of the sheep wintered to the west in the Nevada desert and moved back in the spring. The bulk of these sheep grazed on Cedar Mountain and the surrounding area for a good portion of the spring, summer, and fall. Some increase in numbers could be attributed to the demand for meat for World War I between 1914 and 1918. In 1920 there was the post war depression and following that the drought, which was the start of the decline for sheep numbers. In the mid-1930’s both excess cattle (4,142) and sheep (20,808) were bought from the owners (not clear whether it was local, state or federal program) to reduce herds, and balance the livestock with the available forage. In the mid 1950’s sheep numbers were again reduced dramatically in the Nevada desert winter range by the nuclear fallout during tests.

The 1930’s through the 1960’s the range on Cedar Mountain had more sheep than forage available and therefore the range was affected in the change of the forb community to a grass community. The cattle, because of tall larkspur, were never grazed in big numbers and were only allowed in certain areas.

### Current Range Conditions

Present grazing in the analysis area has been reduced dramatically from past grazing use. Estimated sheep numbers are 10% of historic levels. The amount of cattle grazed in the area has been somewhat reduced, but for the most part has been stable. Cattle numbers

have been limited by the amount of poisonous plants (tall larkspur) in the area. Most of the upper plateau is in a stable state, meaning the transition from a forb dominated type to a grass dominated type is permanent without some mechanical or chemical treatments. Grazing practices presently are season long, beginning in the early spring and continuing until snowfall. There are no set schedules or rotations for the whole area though some rest rotation pastures are used. Some of the smaller tracts of land are grazed. There are instances of the sheep and cattle that move from the private land to permits on federal property.

## Aspen

The Cedar Mountain assessment area includes approximately 122,000 acres reaching from the high plateau near the Dixie National Forest at approximately 10,000 feet to the canyons and valley bottoms nearing Zion National Park at 6,000 feet. The drastic change in elevation results in a vegetation gradient (See vegetation map in Appendix B-2). The highest portion of the assessment area borders the transition zone from mixed conifer (aspen, Douglas-fir, and spruce) to aspen. South of the transition zone, a high plateau consists of undulating land, covered with a mosaic of aspen stands intermixed with grassland and sagebrush flats (7-9000 feet). An abrupt and distinct drop in elevation occurs south of the plateau, dropping into another transition zone of ponderosa pine and aspen. As the land continues to drop in elevation a shrubland cover takes over consisting of predominately Gambel oak woodland with patches of ponderosa pine intermixed as well. Eventually at the lowest elevations of the study area, pinyon pine, juniper, and other more drought tolerant species take dominance. ReGap 2004 cover data was used to determine vegetation cover and may contain discrepancies in relation to actual on the ground conditions (Figure 9).

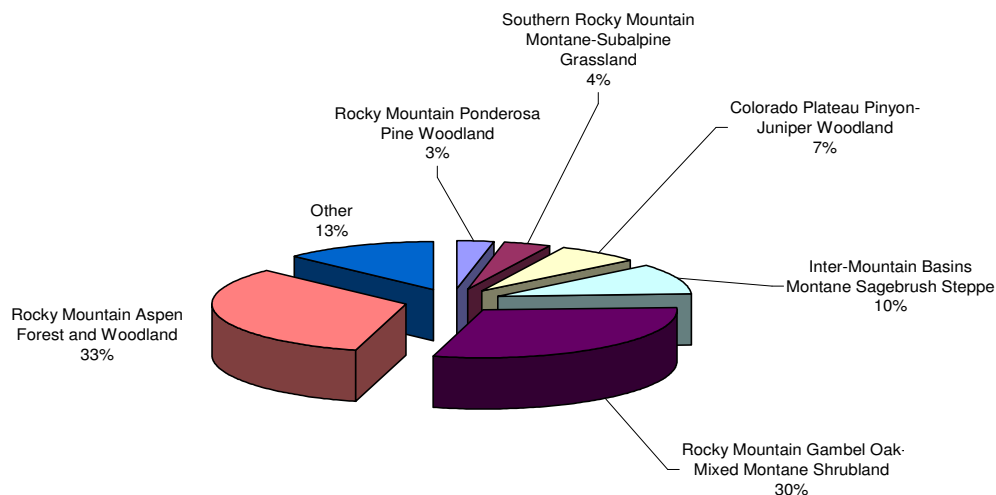


Figure 9. Proportion of vegetation communities within Cedar Mountain Study Area based on ReGap.

### Historic Aspen Conditions

Of the tree species present within the assessment area, aspen is the most important in terms of ecological productivity. Aspen is a keystone species, meaning decline or degradation of the species would cause substantial change in a community. In fact, outside of riparian areas, aspen communities are considered the most biologically diverse ecosystems in the Intermountain West (Cambell 2000). Aspen stands provide an

abundance of forage, clean water, quality wildlife habitat, aesthetic values, and timber. Quaking aspen is the most widely distributed native North American tree species and covers more land area in Utah than any other tree species. It grows in a great diversity of regions, environments, and communities (DeByle 1985).

Individual aspen trees share a root system thus making an entire group or clone genetically identical. Individual clones can often be identified during the fall when leaves change color. Typically all of the leaves within a single clone will change simultaneously. Large stems in an aspen stand prevent the growth of new seedlings and sapling by exuding a growth inhibiting chemical into the root system. This “apical dominance” can vary from clone to clone and is dependent upon the ratio of the growth inhibiting chemical, auxin, and shoot promoting chemical, cytokinin. During normal seasonal tree growth, there are periods when apical dominance is weak enough to permit suckering (DeByle 1985). Fire or harvesting typically results in thousands of new shoots (ramets) per acre with the lack of the chemical, auxin, in the root system.

### Pre-European Settlement

Prior to European settlement fire played a significant role in shaping the pattern of aspen stands within the assessment area in terms of age and size class distribution. In fact, few aspen stands older than 50 years old may have been found (Kay 2003). Fire in aspen and aspen/conifer stands were larger and more frequent during the mid-19<sup>th</sup> century. Studies of aspen bole scars revealed that fire frequencies of 7 to 10 years would have been likely in Ephraim Canyon (Bradley 1992). Sources of ignition would not have been limited to lightning, but may have also been intentionally started by Native Americans (Ohms 2003). Although stands of aspen lacking a conifer component have been considered to be “asbestos” in terms of wildfire, pure stands of aspen would have burned historically within the project area prior to grazing, when thickets of grass, forbs, shrubs, and aspen regeneration may have been able to carry a low to intermediate intensity ground fire. Fire on Cedar Mountain would likely have occurred during the short dry period between the late winter melt in May through mid-June to the beginning of the monsoon season during the second week of July. However, the fire season may have been longer during drought years that may have had an early snowmelt and limited monsoonal precipitation (see fire section). The effects of fire would have varied depending on the intensity and duration of the fire. Varying fire severity would have created a diverse age and size structure across the landscape.

### Early Pioneers and Eventual Homesteaders

Increment cores from study clones on Cedar Mountain indicate regeneration events between 1857 and 1883. Given the current single-aged and -sized distribution of trees within the assessment area (see Current Conditions below), it is possible that a few large fires may have occurred over a short time frame after arrival of early settlers. Baker studied the fire history in Ephraim Canyon on the Wasatch Plateau and wrote, “after the logger and stockman invaded the mountains, there was a period of frequent and larger fires, after which fires became fewer and fewer, and virtually none occurred (Cambell 2000).”



The mountain highlands to the east of Cedar City were important to both Native Americans and eventually the first white settlers for food, water, fuel, and timber. Early cutting of timber was limited to pine stands at lower elevations near the valley for fear of entering the higher elevations. Impact through cutting and grazing was probably not significant until the later half of the 19<sup>th</sup> Century when a significant number of livestock were on Cedar Mountain. Homesteaders used aspen logs to

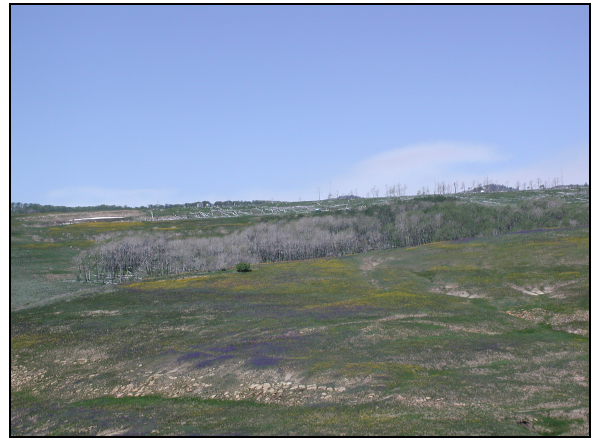
build homes, fences, and as a source for fuel wood. Aspen was readily available near the most desirable building locations such as near streams making it an ideal building material. Conifer was the preferred species for building materials over aspen, therefore most of the wood required to build Cedar City likely came from the conifer forests above the assessment area. Grazing continued to significantly impact the land until the 1930's when owners realized the land had been severely degraded. The extent of the degradation was enough to make ranchers cut down aspen for their sheep to feed off of the top foliage (Jones 2005). During World War II grazing pressure increases may have resulted in decreased aspen regeneration.

### **Current Aspen Conditions**

After approximately 120 years of fire absence from the landscape, aspen within the Cedar Mountain analysis area is in a major state of transformation. The transformation includes aspen returning to a young seedling/sapling sized forest and aspen converting to a grass/forb and sagebrush community (see photos below).



Aspen Decadence with Regeneration



Aspen Decadence without Regeneration

This transformation is a result of a general lack of fire during post-settlement time to the present. The aspen on Cedar Mountain are dominated by stands 119 to 145 years old and greater than 12 inches in diameter (Ohms, 2003). Many of these stands are showing significant mortality and are succumbing to a variety of insects and diseases. In the West,



aspen reaches its pathological rotation age between 100 and 120 years of age; thereafter, increases in natural mortality would be expected to increase. Among the decadent stands, many have significant regeneration (2-12 feet tall) while others have limited or no regeneration. Thus, widespread decadence is giving rise to two contrasting situations: creation of a new generation of single-age classed stands and conversion of aspen to grass/forb and sagebrush communities. In fact, stands lacking in regeneration have been observed converting to sagebrush and grass/forb communities over the past 10 years. While some stands are showing a new generation of seedling/sapling sized trees in the understory, other stands have completely converted to grass/forb and sagebrush communities. With a large tree dominated landscape, pole size stands are rare as observed by some landowners who have had to find aspen poles for fencing outside of the assessment area. Table 8 shows contrasting existing and pre-settlement conditions within the aspen.

Table 8. Historic and current conditions amongst aspen stands within the assessment area.

Assessment Area Characteristics	Historical Condition	Current Condition
Average Stand Age	50	120
Age Class Distribution Among Stands	All	Single Aged
Size Class Distribution Among Stands	All	Single Size Class
Fire	Frequent	Infrequent
Fire Intensity	Mixed	Low, Nonspreading

#### Landscape to Stand Level Management of Aspen

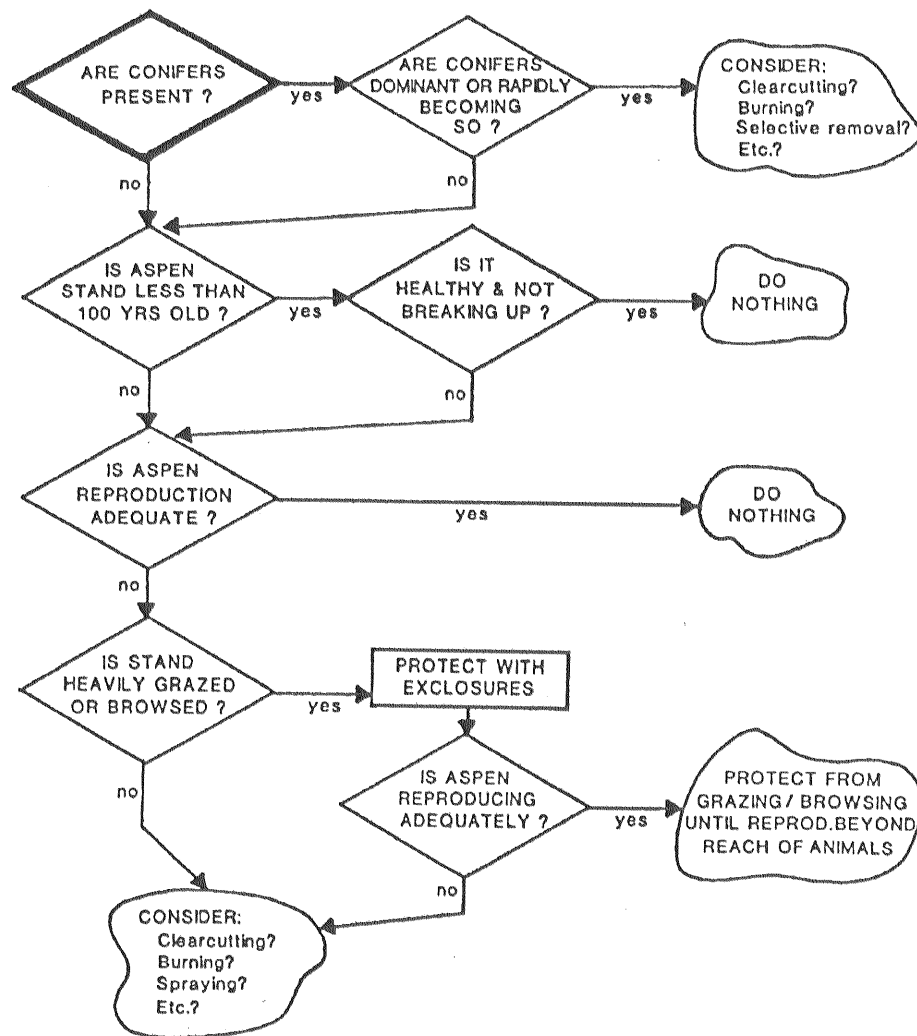
Fire starts in aspen stands within the assessment area have not spread away from individual trees or are suppressed immediately (see fire section). In the absence of fire, mechanical treatment is applied to regenerate aspen. Clearfelling is most typically used and results in the greatest amount of regeneration by removing all of the apically dominant main stems.

Applying disturbance activities to increase size and age diversity amongst stands will result in a landscape that is resilient; thus allowing the ecosystem's full complement of species to persist (USDA 2000). The following landscape level age-class distributions have been developed by Region 4 of the Forest Service (USDA 2000). This distribution could potentially be blended into creating a set of desired conditions on a landscape (Table 9).

Table 9. Age-class distributions of aspen in Region 4.

Age Class	Acres in Aspen
Grass/forb and regeneration and saplings	40%
Young, Mid-aged and Mature Forest	30%
Old Forest	30%

Beyond the landscape level, landowners need to decide which stands need treatment and how intensive treatment needs are. The first key below is a silvicultural decision model for deciding which stands should be treated (Figure 10).



-General decision-making tree for maintaining aspen stands in the Intermountain Region (Mueggler 1989).

Figure 10. Decision model for deciding if stands should be treated.

In terms of level of intensity, Seth Ohms, a former graduate student at Utah State University, researched the aspen decline on Cedar Mountain from 2001-2003 (Ohms 2003). A summary of recommendations is derived from the thesis and summarized below. Treatment intensities are based upon stand basal area. Basal area is defined as the area of the cross section of a tree, usually 4 and ½ feet above the ground. It is a way to measure how much of a site is occupied by trees. Stands with lower basal areas before treatment are expected to result in limited regeneration while stands with many large trees would be expected to regenerate extensively. Basal area and current regeneration

are used to determine the intensity of treatment needed and if seedling/sapling protection is necessary.

*Stands Basal Areas Greater Than 175 Square Feet/Acre with Lack of Regeneration*

A disturbance treatment is recommended. Some short-term management might be needed to ensure survival of the regeneration, if present. However, if treatment is large and regeneration is extensive, no further management may be needed. Short term management would include livestock grazing rotation where aspen are not browsed part of the season. Temporary fencing might be used to exclude livestock and wildlife. Herding could also be utilized until regeneration is high enough so that sheep and deer will no longer be able to browse apical leaders. Short-term management would likely range from 2- 5 years depending on ungulate use.

*Basal Area Less Than 175 Square Feet/Acre*

Studies demonstrated that clones which exhibited low basal areas prior to treatment will not produce much regeneration. Management of these clones should be similar to the first recommendation but with greater intensity.

*Basal Area Less Than 110 Square Feet/Acre*

Ensure survival of the few suckers that regenerate in clones with very low basal area. Management actions should be greater intensity than the first two, though duration the same. Ungulate exclusion may be the best management practice for sucker and clone survival.

*Areas with Regeneration With Signs of Browsing*

If regeneration is present, no disturbance treatment is recommended. If regeneration shows signs of suppression from browsing, ungulate protection may be necessary. With a lack of intensive disturbance, long-term protection would need to be implemented. If the owner desired treatment either to realize the merchantable value of the stand or other reasons, the previous intensities could be prescribed based upon the overstory basal area.

*Areas With Regeneration without Signs of Browsing*

No Treatment would be done if the stand is regenerating successfully and no signs of browse are present.

In summary, the following points must be considered when treating aspen:

- Aspen stands lose reproductive vigor as main stems decline, causing root systems to shrink, thus making treatment most advantageous when stands are still healthy.
- Extensive grazing by wildlife and livestock can reduce regeneration numbers as well and slowly cause a reduction of carbohydrate stores in the root system, attributing to the further decline of stands (DeByle 1985).
- Treatment is typically applied on a large enough scale to reduce the effects of grazing. Other types of treatments such as thinning can also be used, but run a risk of creating entry wounds for insect and disease infestation and allow residual trees to continue to maintain apical dominance thus reducing regeneration.
- Thickets of regeneration may result in a temporary decrease of forage.

Finally, treatment of aspen should include activities that are done in a timely manner before decadence becomes widespread, on a large but not necessarily contiguous area (500 to 1,000 acres or more) to disperse ungulate pressures, and often enough to help restore structural diversity on the landscape (Cambell 2002).

### Recent Aspen Use

Given the single stand age that was created with the arrival of the homesteaders on Cedar Mountain, intensive utilization of aspen for wood products did not occur until stands reached merchantable size in the 1960's. Logging for excelsior peaked between the 1960's and late 1970's not only locally, but throughout Utah. Loggers would cut aspen in the spring when the bark could be peeled back with ease. Excelsior products include but are not limited to evaporator cooler pads, fruit packing material, and turkey bedding. The wood material itself can be made into but not limited to such products as paneling, pallets, and waferboard. With the advent of new petroleum based backing materials the demand for excelsior fell while cutting on public lands faced reductions as well. Simultaneously local "mom and pop" mills closed, thus reducing demand for aspen. Landowners today are applying aspen treatments for multiple reasons most of which are other than timber production. The most common reason is regenerating stands to maintain high quality grazing that exists in aspen stands. Demand and value for aspen is low in the local area. Merchantable timber within the analysis area is probably dropping significantly given the amount of insect and disease infestation across the landscape.

## **Gamble Oak/Pinyon-Juniper Communities**

### Historic Conditions

In the past, more extensive grass cover likely permitted relatively frequent fires during the dry season. Such fires would have inhibited the establishment of oak seedlings and killed smaller stems on the margins of existing clones. In many places in central Utah, older oak clones contain charcoal as evidence of such fires (Gruell 1990). Fire would have regenerated pinyon-juniper stands, creating a mosaic of age and size classes. Much of the Gamble oak and pinyon-juniper within the project area follows the steep sloping hills and canyons that fall below the plateau region of the study area. Pinyon and juniper occur intermixed as well. Pinyon seeds were a staple food of Native Americans. Both pinyon, juniper, and oak were used for fence posts and fuelwood as well and served as winter range for ungulates.

### Current Conditions

Gamble oak shrubland and pinyon-juniper composes approximately 36 percent of the assessment area. Other species that may occur within or below the Gamble oak dominated area of the study area include mountain mahogany, chaparral, and sagebrush. These woodlands generally occur in the southern portion of the Cedar Mountain. area or between 6,000 and 7,800 feet in elevation. With the elimination of fires since pioneer settlement, oak stands are now more extensive than they were 75-150 years ago, and at greater risk for high-intensity, fast moving fires (Bradley 1992) (see fire section).

## Chapter 3: Other Resources

### Soils

Soils can tell us much about our past. They are derived from a variety of parent materials and are transported by wind, water, ice, gravity, or humans. Soil material has been transported to or formed in its present location over very long to very short periods of time. What occurs in or under a soil can indicate how old a buried soil layer is and even how it got to its present location.

The rolling grasslands are covered with a variety of grass and forbs. Some areas are densely covered while others have sparse cover and some soil exposed. Bare soils appeared to be easily eroded by the movement of water as there is evidence along the roads showing movement of fine sediment where water was running or had been moving. One slump area (near some small trailers) was noticed below an area of the aspen decline. Other areas of mudslides, debris flows, or mass movement appear on the northeast side of Black Mountain and in Cedar Canyon along state highway 14 which occurred in April of 2005. All of these movements were on slopes greater than 35%. Soils on the Cedar Mountain Assessment area are productive with some compaction and erosion occurring, and some areas showing signs of movement.

The soil order Mollisol comprises the majority of the assessment area. These soils are characterized by a thick, dark, relatively fertile surface soil which has been formed under grassland vegetation or in forested zones where grasses are an important component of the understory. These soils are rich in humus (dead and decaying plant and animal matter contributed mainly by grasses), which acts as a natural fertilizer and gives the soil its dark color. This soil order supports rangeland, wildlife habitat, recreation, and timber in the higher elevations, and nonirrigated cropland, rangeland, and wildlife habitat in the lower elevations.

A Soil Survey of Iron-Washington Area, Utah, Parts of Iron, Kane, and Washington counties was done in 1990 by the Natural Resources Conservation Service (NRCS) in a joint effort with state and federal agencies. Twenty-six different types of soil were classified in the assessment area. Of these types, 7 comprise 82% of the soils in the assessment area and are described below.

Faim Clay Loam – 26% of the assessment area.

This soil is found on mountain slopes, mountaintops, and mountain valleys, with the dominate vegetation being aspen or mountain big sage. This is the most abundant soil type in the area. This soil type ranges in elevation from 8,000 to 9,400 feet. Precipitation over this area would be from 22 to 30 inches annually. The soil profile is comprised of clay loam, clay, or silty clay. These soils are very deep, up to >60 inches, well drained, with slow permeability, typically derived from parent material of sandstone, shale and igneous rock. This soil type is found on slopes from 4 to 40%. This soil regime has approximately 11 inches of available water capacity, which is the quantity of water that

the soil is capable of storing for use by plants. Rangeland productivity for a normal year averages 1800 to 2075 pounds per acre.

Detra complex – 16% of the assessment area.

Found on mountain tops on 1 to 10% slopes, with an elevation of 7200 to 8300 feet and 16 to 22 inches annual moisture. They are very deep (more than 60 inches), well drained, and derived mainly from sedimentary rock, with a loam, clay loam, gravely clay loam soil profile. These sites are dominated by low sagebrush. This soil regime has approximately 8 inches available water capacity. Rangeland productivity for a normal year averages 1650 pounds per acre.

Kunz/Ramps – 3% of the assessment area.

Found on mountain slopes, 8 to 25% slope, with an elevation of 6000 to 7700 feet and 16 to 22 inches annual moisture, moderate to very deep 20 to 60 inches, well drained, derived mainly from sandstone parent material. A soil profile of fine sandy loam to cobbly fine sandy loam, available water capacity from 4 to 10 inches. Permeability is moderately slow to moderate. These sites are dominated by oak. Rangeland productivity for a normal year averages 1400 to 1650 pounds per acre.

Paunsaugunt – 7% of the assessment area.

Found on mountain slopes, 25 to 60% slope, with an elevation of 6100 feet to 7800 feet and 16 to 22 inches annual precipitation. Shallow soil depth (10 to 20 inches), well drained, moderate permeability and derived from a parent material of limestone. Typical soil profile is extremely stoney loam, gravely loam, very gravely loam and limestone bedrock. The available water capacity for this soil type is 2 inches. This site favors ponderosa pine. Rangeland productivity for a normal year averages 725 pounds per acre.

Fughes/Sheckle – 10% of the assessment area.

Found on mountaintops, 4 to 25% slope, with an elevation of 7200 feet to 8500 feet and 16 to 22 inches annual precipitation. Deep to very deep soil depth (40 to >60 inches), well drained, moderate permeability, and derived from sandstone, siltstone, and shale. The soil profile consists of loam, clay loam, and sandy clay loam. This site would be dominated by oak. It would have 9 inches of available water capacity. Rangeland productivity for a normal year averages 1650 pounds per acre.

Seth – 11% of the assessment area.

Found on mountain slopes, and mountaintops, 2 to 40% slope, with an elevation of 8000 to 9500 feet and 22 to 30 inches annual precipitation. Soil is very deep, well drained, moderately slow or slow permeability, with a typical soil profile of loam, gravelly clay, very gravelly clay loam, with parent material of basalt. 8 inches available water capacity. This site would be dominated by aspen. Rangeland productivity for a normal year averages 2075 pounds per acre.

Syrett – 5% of the assessment area

Found on mountain slopes, 25 to 60% slope, with an elevation of 6800 to 8800 feet, moderately deep (20 to 40 inches), well drained, moderate permeability, 16 to 22 inches annual precipitation, parent material is limestone, sandstone, and shale, typical profile

gravelly loam, very gravelly loam, limestone bedrock. Available water capacity of 2 inches. Range sites dominated by oak. Rangeland productivity for a normal year averages 1400 pounds per acre.

## Hydrology

The Cedar Mountain assessment area is divided into two subbasins, the Virgin River, and Coal Creek. Sevier Creek subbasin is outside of the assessment area along the northeast edge. Refer to watershed map in Appendix B-3.

Approximately three-fourths of the assessment area is located on the Virgin River subbasin which occupies all but the northern quarter of the assessment area. The northern part of the area is in the Coal Creek subbasin. The Coal Creek subbasin drains to the north and west, the Sevier Creek subbasin drains east/northeast, and the Virgin River subbasin drains south. Deep Creek and Crystal Creek are the two main drainages in Cedar Mountain assessment area and drain into the Virgin River subbasin. Deep Creek has been proposed for a wild and scenic river designation.

Two reservoirs are located in the assessment area, the Kolob and the Blue Springs. The Virgin River system and La Verkin Creek, drain the Pine Valley Mountains as well as the Zion National Park area on the south flank of the High Plateaus. The Virgin River flows into Arizona through the spectacular Virgin River Canyon before entering Nevada, where it joins the Colorado River at Lake Mead.

Water sources on the plateau areas in the assessment area are natural spring developments, seeps, and natural streams. Portions of the headwaters of the Virgin River begin in the assessment area. Deep Creek and Crystal Creek are situated in the bottoms off of the plateaus in the pinyon-juniper plant communities.

The dominate climatic regimes in the assessment area are High Mountain and Mountain. The average annual precipitation in these two regimes are 22 to 30 inches and 16 to 22 inches, respectively. Much of this precipitation arrives as snowfall in the winter, but the area is also subject to high intensity thunderstorms in the summer. Annual peak stream flows occur most often between May and June, consisting mainly of snowmelt.

Three rainfall peaks affect the lower valley portion of the Virgin River drainage in the extreme southwestern portion of the state. These peaks include a mild winter maximum associated with Pacific storm fronts, a July thunderstorm peak and a minor peak in October associated with the activity of Nevada lows aloft. The spring low aloft weather pattern has less impact on this section of the state.

A system of dams and reservoirs developed in Utah has become an integral part of the state's economy. This system involves practically every perennial stream in the state and provides water storage, flood control, electrical power production, and recreation. Practically every city and farm in Utah is dependent upon dams to guarantee a year-round supply of water for domestic, industrial, and agricultural use.

The Utah State Division of Water Quality assigns beneficial uses to all waters within the State to protect them from controllable pollution (Utah Division of Water Quality 1994).



The beneficial uses of the waters within the analysis area are irrigation, recreation, domestic and livestock watering.

Currently none of the waters in the assessment area are on the State of Utah's 303(d) list of impaired water bodies. Deep Creek and Crystal Creek have not been assessed to date.

A large part of the assessment area is used as rangeland for grazing cattle and sheep. The Enterprise and Iron (E&I) Soil Conservation District was organized on September 13, 1966, to help farmers and ranchers solve their soil and water conservation problems.

Tamarisk and other aquatic invasive species which may or may not be in the assessment area drainages are found in drainages in the general Cedar City area. These non-native species can alter native riparian vegetation composition, increase the salinity of the surrounding soils and potentially change the flow regime of springs and streams by lowering surface water tables. The altered flow regimes and water tables have the potential to dry up springs and convert perennial streams to intermittent or intermittent streams to ephemeral (particularly in small stream systems).

Town water sources are Cedar Canyon Springs, Quichapa Canyon Springs, Quichapa Well Field and Enoch Basin these water sources are stored in multiple water storage tanks around the city.

Iron County has experienced a steady increase in population and irrigated croplands since 1970. Diminished water supplies and a lowered water table, coupled with the increase in population and irrigated croplands highlighted the need for better water management. In 1996, the Central Iron County Water Conservancy (CICWD) was established. Water rights in the area are already over-allocated. The District is looking for opportunities to obtain water rights because they can reduce the risk of over-mining the groundwater aquifers.

All water is fully appropriated, so no new appropriations can happen. Transbasin water transfers are not allowed; this would involve two different hydrological systems that are not connected. In principle, interbasin transfers are possible as long as no new appropriation is established. An interbasin transfer is hydrologically connected and is based on an existing appropriation. The issue of priority with competing interbasin transfer is complicated. With an interbasin transfer the original priority date is maintained. However, it is also assumed that a recent transfer of a senior appropriation should not adversely affect a junior appropriation that was transferred at an earlier date.

There is precedent to do an interbasin transfer, such as the transfer in the Greens Lake/Cedar Highlands area approximately 14 years ago. Another application in Cole Creek was denied, because no water allocations were available.

There are 2 pending applications, one for 14 parcels for domestic/irrigation, and one for single family irrigation that have been protested by the Mountain Valley Water Protection Association. On the basis of public interest issues (risk of slumping increased in a slide area due to pumping and contaminant concerns from potential increases in septic tanks).

This would be a new consideration from the earlier Greens Lake transfer which raised concerns over displacement of priority water rights.

State law requires individual applications to be considered independently on their own merits; therefore a general moratorium cannot be done according to the regional engineer. There is a State Supreme Court decision pending re: moving valley floor subsurface water rights upslope onto the headwaters that may be relevant to these pending applications. ([www.waterrights.utah.gov](http://www.waterrights.utah.gov))

## Wildlife

Wildlife species and their habitats found in the Cedar Mountain Assessment Area would be comparable to the Cedar City Ranger District of the Dixie National Forest (NF). The assessment area's conditions would be similar to wildlife and vegetative conditions found on the Dixie NF. Lands under the administration of the Bureau of Land Management (BLM) and National Park Service (NPS) are within or adjacent to the assessment area's boundaries, but are not high-elevation, aspen dominated vegetative cover types. However, wildlife species and their habitats found on BLM and NPS lands should be considered, as private landowners from the assessment area are permitted to use these lands for grazing operations (BLM), or are adjacent to federally-administered lands (NPS).

The Dixie National Forest Management Direction Package (*in prep.*) outlines strategies for the Cedar Breaks Geographic Area to achieve specific objectives, including aspen management in the Webster Flat area and consideration of summer mule deer, elk and wild turkey habitat when planning vegetation manipulations within the Cedar Breaks Geographic Area. The Dixie NF conditions are used as a reference condition (general wildlife conditions) for the assessment area, and the Dixie NF various project decision documents serve as a primary information source. Species accounts and reports from the Utah Division of Wildlife Resources (DWR) and other sources were freely used as source material and are cited in the references section of this report. Additional information was derived from interviews with agency staff from the Dixie NF, the BLM, NPS, and DWR and key informants are acknowledged.

Wildlife habitat in and around the assessment area includes ponderosa pine, mixed conifer, aspen, subalpine, willow/riparian, and rock habitats at relatively high elevations in southern Utah and supports a variety of wildlife species. Species identified during agency interviews that would be of particular interest to agencies or the local community include threatened, endangered, and sensitive species, as well as species of local interest (Table 10). Common resident mammalian species include mule deer, elk, wild turkey, forest grouse, bobcat, mountain lion, bear, coyote, pika, red squirrel, and porcupine. Several bat species can be observed at night flying along the edge of the forest and reservoirs, and other nocturnal wildlife species include great-horned and flammulated owls, striped skunks, and raccoons. The most common birds found during the spring and summer months include Clark's nutcracker, Stellar's jay, gray jay, mountain chickadee, red-breasted nuthatch, white-breasted nuthatch, hermit thrush, western tanager, warbling vireo, plumbeous vireo, ruby-crowned kinglet, yellow-rumped (Audubon's) warbler, black-headed junco, red-tailed hawk, and less often, Grace's warbler and northern goshawk. Osprey are known to nest and forage around near-by open bodies of water, and turkey vultures and common ravens are seen frequently. The most common reptiles are garter snakes and gopher snakes, but western rattlesnakes are not common at these elevations.

Table 10. Species of interest identified in the assessment area through key informant interviews.

Species	Species Identified as of Agency Interest	Species Identified as of Local Community Interest
Bald Eagle (T) <sup>a</sup> ( <i>Haliaeetus leucocephalus</i> )	X	
Mexican Spotted Owl (T) ( <i>Strix occidentalis lucida</i> )	X	
Utah Prairie Dog (T) <sup>b</sup> ( <i>Cynomys parvidens</i> )	X	
American Peregrine Falcon <sup>b</sup> ( <i>Falco peregrinus anatum</i> )	X	
Northern Goshawk <sup>c</sup> ( <i>Accipiter gentiles</i> )	X	
Desert Bighorn Sheep ( <i>Ovis canadensis nelsoni</i> )	X	
Mule Deer ( <i>Odocoileus hemionius</i> )	X	X
Rocky Mountain Elk ( <i>Elaphus canadensis</i> )	X	X
Wild Turkey ( <i>Meleagrus gallopavo</i> )	X	X
Mountain Lion ( <i>Felis concolor</i> )		X
Black Bear ( <i>Ursus americanus</i> )		X
Coyote ( <i>Canis latrans</i> )		X

<sup>a</sup> State of Utah Endangered Species

<sup>b</sup> State of Utah Threatened Species

<sup>c</sup> State of Utah Species with special concern due to substantial decrease in population, distribution, or habitat availability or limited distribution or specialized habitat use.

## Species of Interest

### Bald Eagle

*Reference Condition:* The bald eagle was listed as a threatened species in 1978 and is managed under the Northern States Bald Eagle Recovery Plan. Bald eagles range across North America breeding from south of the Arctic tundra to the southern United States and Baja, California, moving south to open water during winter. Utah's few nesting bald eagles occur along the Colorado and Jordan Rivers, but wintering bald eagles are numerous across the state.

Eagles often congregate in areas of open water to feed but also use a variety of drier foraging habitats from mid-elevation canyons to low-elevation valleys and deserts. Wintering eagles roost primarily in forested canyons or tall cottonwoods along streams and reservoirs. Wintering eagles can be found in each of the Utah Ecoregions, but their numbers and distribution vary with severity of winter conditions.

Bald eagles occur on the Dixie NF during late fall, winter and spring months. Bald eagles forage and roost near open water bodies across the forest and roost communally,

perennially using the same roost trees on the Cedar City Ranger District. When water bodies freeze in either late fall or early winter, bald eagles move down in elevation off the Dixie NF to forage. There are no bald eagle nest sites on the Cedar City Ranger District or anywhere on the Dixie NF, although 2 mature bald eagles were observed on several occasions during the summer of 2003, without nesting, at Panguitch Lake.

Bald eagle roost habitat near water bodies being impacted and loss of roost habitat is a primary concern for the Dixie NF, although the rating for habitat enhancement priority may be low in a given project area.

*Assessment Area Considerations:* Roosting and foraging habitat lies outside of, but in proximity to, the assessment area. No wildlife/livestock conflicts were identified for the assessment area. Vegetative treatments would have little, if any effect on bald eagles or their habitats, as there are no large ponded or flowing bodies of water within the assessment area that would be impacted.

### Mexican Spotted Owl

*Reference Condition:* The Mexican Spotted Owl was listed as a threatened species in 1993 and is managed under the Mexican Spotted Owl Recovery Plan. Extensive surveys during the 1990's resulted in the location of more than 20 owl nests in southeastern Utah (HDRC, 1993). All of these are on National Park Service administered lands, such as Zion and Capitol Reef National Monument. In Utah, the owl is known to nest only in steep walled canyons of the Colorado Plateau ecoregion and adjacent portions of the Utah Mountains ecoregion. Most nesting sites occur in southern Utah, but sites have been found in the northeastern corner of the state. Population clusters have been identified around Zion National Park, Capitol Reef National Park, Canyonlands National Park, and the Dark Canyon complex of the Abajo Mountains.

Unlike owls in other portions of the range which nest primarily in the trees of mature conifer forests, Utah owls nest exclusively in caves in steep-walled, usually narrow, moist canyons. These canyons are typified by streamside woods, and/or narrow stringers of conifer trees, though some sites are in relatively dry canyons. Canyons where nests occur are usually part of a rugged, complex canyon system which has several side canyons and hanging canyons. All known nesting sites in Utah are below 8000 feet elevation. Winter habitat is essentially the same as breeding habitat, though owls may seek warmer, more open canyons in the winter. Owls forage primarily on the canyon floors and on elevated benches within the canyons. However, owls occasionally forage on mesa tops which are usually covered by pinyon-juniper or shrubland habitats.

No owl nests have been located on the Cedar City Ranger District or anywhere on the Dixie NF. During the early 1990's coniferous habitats on the plateau were extensively surveyed for owls. After several years of surveying mixed conifer habitats, it was determined that suitable nesting habitat in Utah consisted of steep walled, narrow, cool canyons and not plateau tops. Therefore, surveying on the plateau for nesting was discontinued and efforts were focused on canyon habitats.

Potentially suitable owl breeding and roosting habitat (canyons) was identified in 1997

and 2000. Dixie NF biologists identified additional potential owl habitat in mixed conifer cover types on slopes greater than 40%. Mixed conifer cover types within the project area are considered important to juvenile dispersal and winter foraging habitat. Owls have only been found during the winter in non-canyon areas within a mixed-conifer cover type on the Cedar City Ranger District. Six occurrences of owl have been documented on the Cedar City Ranger District.

The primary threat to owls across their range is habitat loss because of past, current and future timber harvest practices. Significant portions of habitat have been lost or modified from diverse, multiple layered forests, which owls prefer, to uniform forests, grasslands, and shrublands with little structural diversity. The population trend of Mexican spotted owls is not well understood, but the current number of breeding pairs is probably sufficient to maintain the population if habitat loss is curtailed and other potential threats are properly managed. In Utah, potential threats to owls include human disturbance associated with increasing recreational activities in canyon habitats, overgrazing and timber harvest in foraging areas, road development in canyons, catastrophic wild fire, and oil, gas, and mineral development. These activities may lead to habitat alteration and/or direct disturbance of owls.

*Assessment Area Considerations:* Mexican spotted owl use of the assessment area is likely limited to winter foraging/roosting or juvenile dispersal in the lower elevation mixed conifer woodlands, such that management in pure aspen stands or open meadows would not affect owls. Vegetative treatments in overstocked stands with dense woody understory could improve owl habitat over time, especially if conservation measures were incorporated to minimize the immediate effects of treatments. Retention of forested corridors between blocks of habitat would allow movement of owls through the treatment areas. Overstocked stand conditions are considered marginal to unsuitable foraging habitat and thinning and prescribed burning of these stands would be expected to improve foraging opportunities. Treatments that retain snags and coarse woody debris within or adjacent to the treatment areas would retain important existing foraging habitat components.

### American Peregrine Falcon

*Reference Conditions:* The peregrine falcon was delisted as an endangered species in 1999 but is considered a state threatened species. With the recent delisting, a Proposed Monitoring Plan for the American Peregrine Falcon in the United States prescribes monitoring of peregrine falcon territories every third year beginning in 2002 and ending in 2014. It is currently managed as a sensitive species by state and federal land management and wildlife agencies.

Peregrine populations declined dramatically in the 1940's-1960's, mostly attributable to the effects of pesticide residues which caused eggshell thinning and decreased productivity. Other factors that probably contributed to the population decline include climatic change (long-term drying of wetlands), botulism, and human disturbance (shooting, nest site disturbance, etc.). Peregrine populations rebounded after being listed as an endangered species.

The peregrine's historic distribution in Utah is well documented along the Wasatch Front, but is less well understood for the remote and rugged canyon country of southern Utah. Currently, the nesting population in Utah is increasing and breeding sites are known to occur in the Utah Mountain, Basin and Range, and Mojave and Colorado Plateau ecoregions, with the largest concentrations along the Colorado River and its tributaries in the southeastern portion of the state.

Peregrines nest on tall cliffs (usually below 6000 feet elevation) near and often directly above streams, rivers, or reservoirs, although some nest sites can be several miles from water. Nests are shallow scrapes placed in cracks, holes, and small caves on cliff faces. Peregrines prey on a variety of birds which are associated with open water, streamside, wetland, cliff, and open meadow habitats, foraging along marshes, streams, and lakes within a 10-mile radius of the nest. All riparian areas, open meadows and ponds are considered foraging habitat. Hunting techniques of this raptor require large open areas, with several studies suggesting that openings be at least 25 acres in size.

Monitoring has been conducted for nesting peregrine falcons on the Cedar City Ranger District since 1991. There are 8 known nest sites on the Dixie NF. In addition, there have been 3 nest sites located on private and BLM lands, which are adjacent to the Dixie NF. Activity and productivity varies annually. Loss of foraging habitat through reduced riparian areas, along with meadows and parklands that are in poor condition, are primary concerns for the Dixie NF and the priority rating for need for habitat improvement is high in areas within 1 mile of nest sites, riparian habitat, and meadow protection.

*Assessment Area Considerations:* Vegetative treatments such as thinning, hand and machine piling of debris, and prescribed fire, intended to reduce ground fuels, the understory, and overstory of forested habitats could result in temporary fluctuations in avian prey species composition and abundance. Avian prey species that rely on closed canopies would be displaced, while avian prey species that prefer more open habitats would increase. As peregrines favor more open habitat hunting strategies, this should lead to improved foraging opportunities. Regeneration over time would lead to a more diverse vegetative structural stage adjacent to open meadows and edges, and avian prey species composition and occurrence would be expected to become more diverse and abundant, resulting in continually improving foraging habitats. To maintain these benefits, treatments would need to be recurring on an intermittent spatial and temporal basis across the landscape.

#### Northern Goshawk

*Reference Conditions* (Kennedy 2003): Northern goshawks occupy a wide variety of forest habitats throughout North America. Although there are few data regarding historical changes, researchers suggest the distribution of the goshawk in the northern and western portions of its range is relatively unchanged since Europeans settled North America and are distributed throughout forested areas of the western U.S. They nest in a variety of forest types, including boreal, deciduous and western coniferous forests. However, goshawks are not uniformly distributed throughout areas with large, contiguous

areas of montane forests. It is likely that discontinuities occur in forested areas where prey abundance is low or the vegetative structure of the forest precludes access to prey.

Historically labeled an old-growth indicator species by the USFS in the 1980s, the status review conducted by USFWS found that while the goshawk typically does use mature forest or larger trees for nesting habitat, it appears to be a forest generalist in terms of the types and ages of forests it will use to meet its life history requirements.

Breeding season habitat includes nesting, post-fledging areas (PFA) and foraging habitat. The area immediately surrounding the nest tree, referred to as the nest site or nest area often contains alternative nests and may be reused in consecutive years. Goshawk nests are found in a variety of tree species including Fremont cottonwood, quaking aspen, ponderosa pine, lodgepole pine and subalpine fir. Although canopy closure in the nest area is often cited as an important habitat feature the nest tree itself may be dead and offer little canopy closure. Although considered a habitat generalist at large spatial scales, goshawks tend to nest in a relatively narrow range of structural conditions and seem to prefer mature forests with large trees, relatively closed canopies (60–90%), and open understories. Nests are frequently found near the lower portion of moderate slopes, close to water, and often adjacent to a canopy break. Typical goshawk breeding areas contain several alternative nests that are used over several years.

The PFA surrounds the nest area and is defined as the area used by the family group from the time the young fledge until they are no longer dependent on the adults for food. PFAs may be important to fledglings by providing prey items on which to develop hunting skills, as well as cover from predators and prey. Goshawks use all forest types, but appear to select forests with a high density of large trees, greater canopy cover and high canopy closure, high basal area and relatively open understories in which to hunt and spend a substantial amount of time hunting along edges and crossing openings between woodlands.

Goshawks tend to hunt in the ground-shrub and shrub-canopy forest zones. Although prey is abundant in this shrub layer, it is important to consider whether prey items are available to goshawks. For example, even a high abundance of hares may have low availability to goshawks in a dense aspen regeneration area where goshawks are unable to fly or hunt. Prey abundance and availability are important habitat attributes and potential limiting factors for goshawk populations.

Goshawk prey species need a variety of habitat conditions from early to mature seral stages. Goshawk foraging areas should include a variety of habitats types to support an abundant prey base and include a mosaic of vegetation structural stages interspersed throughout the area, consisting approximately of 20% each of old, mature, middle-aged and young forests, 10% in the seedling/sapling stage, and 10% in the grass/forb/shrub stage. The 60% of the stands consisting of older age classes should have relatively open understories with a minimum of 40–60% canopy cover. Forests ideal for producing prey available for goshawks have well-developed herbaceous and shrubby understories associated with small to medium openings, which provide cover and food for many small mammals and birds in the form of seeds, berries, and foliage.



*Recommendations for the Northern Goshawk in the Southwestern U.S.* (Reynolds 1992) emphasizes managing goshawk landscapes to maintain habitat for typical goshawk prey items, as well as nesting and foraging areas. Forest management practices may strongly influence the availability of prey items for the goshawk, thus being a determining factor in the long-term persistence of the species. Goshawks are adapted for hunting in moderately dense, mature forests, and prey availability is more important than prey density in habitat selection. Goshawks probably respond to prey abundance when locating a home range within a large landscape, but select for moderately dense, mature forests where they can use their maneuverability to capture prey when foraging within a home range and habitat type.

The goshawk generally is considered a winter resident throughout its breeding range, but may undertake short-distance migrations. The existence and extent of migratory behavior is geographically and temporally variable, and may be closely tied to food availability. Goshawks in northern areas of their range are known as irruptive or irregular migrants, and is believed to be a response to rapid decreases in prey populations. Natal dispersal is regulated by food availability for at least the first 4 months post-fledging. Fall migrations generally commence after young disperse from natal areas and occur between mid-September and mid-December. In the winter, goshawks have been reported to use a variety of vegetation types, such as forests, woodlands, shrub lands, and forested riparian strips in search of prey.

The goshawk is managed as a sensitive species or species of concern by state and federal land management agencies. Forest-wide monitoring of goshawk territories over time indicate a downward trend in goshawk populations on the Forest. Poor reproductive success due to severe and sustained drought conditions in Southern Utah has been a primary concern. Although the number of active nests has been down, occupied territories (bird in the nest area, but not nesting) have been commonly observed across the Forest and monitoring on the Cedar City Ranger District in 2004 has shown a sharp increase in territory occupancy from the past 2 years with 15 occupied territories in 2004, compared to 3 in 2002 and 2003.

Vegetation structural stage is an important habitat measurement for a variety of species, including northern goshawks. Goshawks typically nest in large mature trees but require a variety of forest age and structure classes, across their home range to provide habitat for prey species. A diversity of vegetation and tree size classes distributed across the landscape is indicative of overall ecosystem health and is important for the northern goshawk and their prey species.

On the Forest, vegetative structural diversity is lacking within all cover types, attributable to current spruce mortality, past fire suppression, and past logging activities. The rating for habitat enhancement priority is high on the Forest where numbers of large trees with interlocking crowns are low or lacking, snags and down logs are lacking, and stand densities are high.

*Assessment Area Considerations:* Goshawk use of the assessment area is likely, although general habitat conditions would probably benefit from treatments. Forest management practices, such as the use of controlled fire and thinning, may improve habitat by opening

up dense understory vegetation, creating snags, downed logs, woody debris, and other conditions that may benefit goshawks and their prey. Forest management activities that enhance the availability of these older forest characteristics could enhance goshawk populations.

During treatments, goshawk foraging habitat can be maintained or restored through means such as protection of specific areas, control of tree spacing and canopy layering, and management strategies that sustain the structure, function, and ecological processes of forests that are important to goshawks. Early seral stage forests and forest edges are also important to hunting goshawks. However, these are typically smaller patches embedded in a larger matrix of older forest and probably openings created by natural disturbance processes in the region, e.g., fire, landslides, floods, wind throw. Forest management practices designed to mimic regional natural disturbance regimes are less likely to lower goshawk population persistence than practices that do not mimic natural disturbance regimes.

### Rocky Mountain Elk

*Reference Conditions:* Elk were once widely distributed throughout North America. However, due to habitat loss and unregulated hunting which occurred during the European settlement of North America, the range inhabited by elk has been greatly reduced and is now generally limited to the Rocky Mountain states and Canada. By the late 1800s, elk were virtually eliminated from Utah. During the early 1900s, sportsmen organizations sponsored reintroduction of elk onto many of Utah's historical elk ranges. This reintroduction of elk has been very successful and the state's current elk population numbers approximately 60,000 animals. In managing elk herds, DWR strives to maintain a healthy population of elk in balance with its habitat and provide for recreational opportunities, such as wildlife viewing and hunting. Hunting is the primary management program used to maintain herd population numbers and reduce damage caused on range and agricultural lands.

Rocky Mountain elk can be found throughout Utah in mountainous habitat. During the hot summer months, elk live fairly high in the mountains, usually between 6,000 and 10,000 feet. In late fall, most elk migrate down the mountain slopes to areas of lower elevation and less snowfall. During the winter, elk congregate in valley bottoms and forage on south-facing slopes where the sun melts snow more quickly and winds prevent deep snow from accumulating. Availability of critical summer and winter habitat are limiting factors to elk survival, but hiding cover, the amount, juxtaposition, and quality of foraging habitat, habitat effectiveness, and availability of migration corridors also are important components for maintaining big game numbers.

Past timber harvests have altered the amount and distribution of hiding and thermal cover, which are further disrupted by the consequent increase in road densities. Livestock management activities have reduced quantity and quality of forage and development has critically limited winter range. Fire suppression has contributed to the decline of vigorous mountain brush interspersed with native grasses and forbs and permitted the encroachment of conifers into meadows and aspen stands, further reducing the amount and quality of summer habitats for elk.

Elk populations have been reduced across the Southern region, as the DWR has moved herd units towards desired unit objectives through controlled hunting. For the Southern region, DWR estimates that overall elk population trends are stable to slightly up and viable. Elk population trends on the Panguitch Lake and Zion units are considered stable and consistent with herd unit objectives.

The Panguitch Lake unit is a highly valued limited entry hunting unit for elk and the Zion unit is designated as an open (any) bull elk unit. This hunting strategy provides excellent hunting opportunities on public lands while providing a mechanism for controlling elk numbers on private lands.

Due to threats to elk habitat from fragmentation, high road densities, urban development, human disturbance, and lack of healthy vegetation composition, the Dixie NF rating for habitat enhancement priority is high within areas where healthy grass/forb component is lacking, road densities are high, and loss of aspen stands are occurring.

*Assessment Area Conditions:* Impacts to hiding cover, foraging habitat, calving habitat, habitat effectiveness, and migration corridors are important considerations for elk management. Hiding cover is considered in connection with disturbance associated with roads, and while plentiful in densely overstocked stands, is generally lacking along roadsides in the assessment area. Summer foraging habitat is available in natural or artificially created openings and is plentiful across the assessment area and is not considered to be limiting. Winter range in the lower elevation ponderosa pine/oak woodlands interspersed with mixed conifer in the assessment area and agricultural fields of the valley floor is critical, but impaired due to urban development and the presence of Interstate 15. Migration corridors are forested areas that elk travel through within their home range or from summer to transitional range in the fall, and then to winter range at lower elevations as snow accumulates. Migration corridors are relatively intact in the assessment area, but as development increases, will become more of a management issue. Calving habitat is typically located on secluded, gentle slopes within a mosaic of open forage areas and densely vegetated hiding cover areas, and can be found in the assessment area. Habitat effectiveness is related to hiding cover and open road densities and is considered low across the assessment area, due to the current open road densities and open stand conditions throughout the summer range.

Vegetation treatments in forested stands and open meadows would improve elk habitat conditions, increasing quantity and quality of browse, grasses and forbs. Thinning in overstocked or decadent stands and prescribed fire in the understory would increase and maintain shrub, grass and forb production, resulting in improved forage for elk. Treatments in aspen stands would be most successful if conducted on a large enough scale so as to not concentrate elk on treated areas; otherwise fencing of treated aspen areas would be necessary to preclude excessive browse pressure that would suppress regeneration and recruitment. Grazing practices that reduce excessive livestock use, either through exclusion or rotation, would be necessary to avoid the cumulative adverse effect of combined wildlife-livestock use that can affect aspen regeneration and recruitment and severely alter aspen community dynamics.

## Mule Deer

*Reference Conditions:* Historically, brushy communities which mule deer need for food and shelter were only found in narrow bands between the forests and the grasslands and along rivers and streams. Explorers' descriptions of deer populations also indicate that there were fewer deer occupying less habitat than there are today. Major changes in habitat and deer populations can be directly tied to human activities, from hunting which reduced herd numbers to agriculture, timber and mining practices which made extensive use of rangelands and forests, changing native grasses to sagebrush and other shrubs. These changes in vegetation, which benefited mule deer, along with the implementation of regulated hunting, allowed deer populations to explode. Populations increased yearly from 1913 to the late 1950s. During the 1950s, deer populations exceeded range capacities, and management efforts were directed at improving range conditions while reducing deer populations. As a result of these efforts, mule deer populations came more in line with the carrying capacity of the land. More recently, long periods of drought, severe winters and the loss of critical habitat have resulted in a general decline in mule deer numbers across the west.

Past timber harvests have altered the amount and distribution of hiding and thermal cover, which are further disrupted by the consequent increase in road densities. Livestock management activities have reduced quantity and quality of forage and development has critically limited winter range. Fire suppression has contributed to the decline of vigorous mountain brush interspersed with native grasses and forbs and permitted the encroachment of conifers into meadows and aspen stands, further reducing the amount and quality of foraging habitat for mule deer.

Mule deer living in areas of high snowfall, like Utah's mountains, or in areas with drastically changing climates, like Utah's deserts, will make seasonal migrations between winter and summer ranges. Generally, mule deer summer at high elevations and winter at low elevations, following the snow line. Availability of critical summer and winter habitat are limiting factors to mule deer survival, but hiding cover, the amount, juxtaposition, and quality of foraging habitat, habitat effectiveness, and availability of migration corridors also are important components for maintaining big game numbers.

Population estimates of deer in the Southern region, including the Panguitch Lake and Zion herd units, indicate declining populations and a downward trend. This is attributed in part to DWR's herd management objective as well as low fawn recruitment. The low fawn crops can be attributed to drought the past few years, but the low carrying capacity on winter range is major limiting factor.

Due to threats to mule deer habitat from fragmentation, high road densities, urban development, human disturbance, and lack of healthy vegetation composition, the Dixie NF rating for habitat enhancement priority is high within areas where healthy grass/forb component is lacking, road densities are high, and loss of aspen stands are occurring.

*Assessment Area Conditions:* Impacts to hiding cover, foraging habitat, fawning habitat, habitat effectiveness, and migration corridors are important considerations for mule deer management. Hiding cover is considered in connection with disturbance associated with roads, and while plentiful in densely overstocked stands, is generally lacking along roadsides in the assessment area. Summer foraging habitat is available in natural or

artificially created openings and is plentiful across the assessment area and is not considered to be limiting. Winter range in the lower elevation ponderosa pine/oak woodlands interspersed with mixed conifer in the assessment area and agricultural fields of the valley floor is critical, but impaired due to urban development and the presence of Interstate 15, as well as sagebrush die-offs. Migration corridors are forested areas that mule deer travel through within their home range or from summer to transitional range in the fall, and then to winter range at lower elevations as snow accumulates. Migration corridors are relatively intact in the assessment area, but as development increases, will become more of a management issue. Fawning habitat is typically located on secluded, gentle slopes within a mosaic of open forage areas and densely vegetated hiding cover areas, and can be found in the assessment area. Habitat effectiveness is related to hiding cover and open road densities and is considered low across the assessment area, due to the current open road densities and open stand conditions throughout the summer range.

While summer range on the assessment area is in relatively good condition, it could be improved through vegetative treatments to recover and maintain native grasses and forbs, as well as aspen stands. It is the winter range that is most limiting, which has been severely impacted by sage-brush declines on SITLA and BLM lands, where the local herds tend to winter. Vegetative treatments in these areas could reduce woodland overstory and encroachment and stimulate sagebrush regeneration.

Vegetation treatments in forested stands and open meadows would improve mule deer habitat conditions, increasing quantity and quality of browse, grasses and forbs. Thinning in overstocked or decadent stands and prescribed fire in the understory would increase and maintain shrub, grass and forb production, resulting in improved forage for mule deer. Treatments in aspen stands would be most successful if conducted on a large enough scale so as to not concentrate mule deer on treated areas; otherwise fencing of treated aspen areas would be necessary to preclude excessive browse pressure that would suppress regeneration and recruitment. Grazing practices that reduce excessive livestock use, either through exclusion or rotation, would be necessary to avoid the cumulative adverse effect of combined wildlife-livestock use that can affect aspen regeneration and recruitment and severely alter aspen community dynamics.

Deer populations can respond rapidly to habitat management, but longer-term influences from fragmentation, degradation or loss of habitat as a result of urban expansion, incompatible land uses, and human disturbances may preclude recovery of mule deer numbers to past levels.

### Wild (Merriam's) Turkey

*Reference Condition:* The DWR initiated an aggressive transplant program for wild turkeys statewide in 1983 and since then, population numbers have been on the increase statewide. Turkey populations have been stable across the Dixie NF. However, population levels can fluctuate considerably due to adverse weather conditions during the spring nesting and brood rearing season, or from over-harvest. Based on hunting statistics provided by DWR, turkey populations are increasing, or are in an upward trend, and populations are viable in the Southern Region.

Merriam's turkeys are found primarily in ponderosa pine forests, but require a mosaic of

habitat components, including openings and edges for feeding, courtship and breeding, interspersed and/or adjacent to forested stands for escape cover, roosting and nesting. Nests are established in dense ground cover, with an overstory of densely spaced trees, usually within a quarter mile of water, as permanent water sources are required by wild turkey. Turkeys require large, mature roost trees and winter roost trees need to be within a half mile of reliable food sources.

Different habitats are used seasonally. Prime winter habitat includes a cover type of 50% mature, mast-producing ponderosa pine, oak and/or pinyon-juniper woodlands. Spring, summer and fall habitats include fields, meadows and open woodlands with a high density of low vegetation that provides an abundance of insects and seeds.

The Dixie NF contains habitat for Merriam's turkey across a variety of cover types, and they are routinely observed on the Cedar City Ranger District. The general area has been experiencing moderate to severe drought conditions for the past 6 years and it is likely that turkey populations have been influenced by this. The rating for habitat enhancement priority is high where urban development is occurring.

*Assessment Area Considerations:* The assessment area is predominantly high use summer habitat, with a small inclusion of critical winter habitat in the lower elevation ponderosa pine/oak woodlands. Existing habitat conditions are suitable, but vegetative treatments could improve the quality and extent of summer and winter habitats.

Reductions in ponderosa pine/oak woodlands that leave larger diameter ponderosa pines would reduce canopy closure and improve growth potential for the shrub understory, improving foraging habitat. As thinned stands matured, larger ponderosa pine trees would provide more roosting habitat and mast production would be stimulated in the oak woodland component. Understory prescribed burns would further enhance stand conditions by increasing ground cover and associated insect prey base, maintaining or enlarging open spaces between trees for improved foraging, and reducing pinyon-juniper encroachment into grasslands. Fire returned to the grassland areas would increase the grass/forb component in meadow openings, improving the seed and insect foraging base for turkeys and their poults.

### Coyote

*Reference Conditions:* Historically, coyotes were most common on the Great Plains of North America. They have since extended their range from Central America to the Arctic, including all of the United States (except Hawaii), Canada, and Mexico.

Many references indicate that coyotes were originally found in relatively open habitats, particularly the grasslands and sparsely wooded areas of the western United States. Coyotes have adapted to and now exist in virtually every type of habitat, arctic to tropic, in North America. Coyotes live in deserts, swamps, tundra, grasslands, brush, dense forests, from below sea level to high mountain ranges, and at all intermediate altitudes. High densities of coyotes also appear in the suburbs of large western cities as well as agricultural communities.

Coyotes often include many items in their diet. Rabbits top the list of their dietary components. Carrion, rodents, ungulates (usually fawns), insects (such as grasshoppers), as well as livestock and poultry, are also consumed. Coyotes readily eat fruits such as watermelons, berries, and other vegetative matter when they are available. In some areas coyotes feed on human refuse at dump sites and take pets (cats and small dogs). Coyotes are opportunistic and generally take prey that is the easiest to secure. Among larger wild animals, coyotes tend to kill young, inexperienced animals, as well as old, sick, or weakened individuals. With domestic animals, coyotes are capable of catching and killing healthy, young, and in some instances, adult prey.

Coyote predation on livestock is generally more severe during early spring and summer than in winter for two reasons. First, sheep and cows are usually under more intensive management during winter, either in feedlots or in pastures that are close to human activity, thus reducing the opportunity for coyotes to take livestock. Second, predators bear young in the spring and raise them through the summer, a process that demands increased nutritional input, for both the whelping and nursing mother and the growing young. This increased demand corresponds to the time when young sheep or beef calves are on pastures or rangeland and are most vulnerable to attack. Coyote predation also may increase during fall when young coyotes disperse from their home ranges and establish new territories.

For managing coyote damage, a variety of control methods must be available since no single method is effective in every situation. Success usually involves an integrated approach, combining good husbandry practices with effective control methods for short periods of time. Regardless of the means used to stop damage, the focus should be on damage prevention and control rather than elimination of coyotes. It is neither wise, practical, or effective to try to kill all coyotes. Lethal control practices may stimulate coyote productivity, possibly resulting in higher levels of depredation, as provisioning of pups appears to be a major motivation for adult coyotes to kill domestic lambs.

USDA Wildlife Services (WS) provides technical assistance and predator control support to private landowners. A myriad of control techniques are described in the Prevention and Control of Wildlife Damage Handbook. Continuing research conducted by USDA's National Wildlife Research Center (NWRC) suggest innovative control techniques, not necessarily lethal, may be of utility for private application. For example, the NWRC tested the bonding of sheep to cattle as a method of protecting sheep from coyote predation. There was clearly some protection afforded the sheep that remained near cattle. Multi-species grazing offers many advantages for optimum utilization of forage, and though additional study and experience is needed, it may also be a tool for coyote damage control.

In Utah, WS targets control levels to keep lamb losses at 5% or less, and adult sheep losses at 3% or less. How these targets are met depend on the particular circumstances of a given area.

*Assessment Area Considerations:* In the assessment area, coyote control is preventive, with an emphasis on intensive control of bonded pairs, as provisioning of pups is a major

contributing factor in depredation. The emphasis is on changing behavioral patterns, rather than numbers of coyotes removed. This approach includes winter aerial gunning of bonded pairs in the assessment area, so that little reproduction or pup provisioning occurs. Coyote numbers are maintained primarily through immigration into territories vacated as a result of the control efforts. This approach must be conducted on a recurring basis annually. While WS activities are not universally endorsed, this particular strategy is not indiscriminate and should not result in take of non-target animals nor eliminate coyotes from the area entirely.

### Mountain Lion

*Reference Conditions:* Mountain lions are opportunistic carnivores. In Utah, mule deer make up over 80% of the mountain lions' diet. Mountain lions will also eat rabbits and hares, rodents (especially porcupines), elk, bobcats, coyotes and, occasionally, livestock. Mountain lions are most often found in habitats where there is abundant prey.

In Utah, mountain lions prefer pinyon-juniper and pine-oak brush areas. Within these habitat types, lions prefer areas where there are rocky cliffs, ledges and tall trees or brush that can be used for cover. Generally, lions avoid areas of sagebrush and low-growing shrubs, areas used for agriculture and pasture lands, and any other areas without adequate tall cover. Female lions with kittens prefer areas with large conifers, boulders and dense shrubs that provide shelter and protection for the kittens.

Habitat quality, prey availability, mountain lion population information, public safety factors, public uses of the area and depredation occurrences are considered when setting harvest regulations. DWR and WS investigate occurrences where lions are suspected of killing livestock. All cases of depredation must be confirmed as lion-caused before trained personnel from WS are authorized by DWR to remove the mountain lion.

*Assessment Area Considerations:* In the assessment area, an estimated 40% of livestock losses can be attributed to mountain lions. WS control of mountain lions is targeted and intended to control depredating behavior, not necessarily to reduce the numbers of mountain lions in the area. Only those mountain lions that repeatedly depredate livestock are removed, and on average, only 1 of 5 mountain lion complaints result in removing a mountain lion.

### Black Bear

*Reference Conditions:* Black bears originally ranged throughout forested areas of North America, but are now found primarily in less settled remote areas, although increasing use of and development in bear habitat has led to escalating human/wildlife conflicts as bears occupy and habituate to human settings.

In Utah, black bears inhabit wild areas of Gambel oaks, conifers and moist creek bottoms. They often graze along the edges of green meadows. They also select habitat with appropriate sites for dens, including areas with caves or areas in which dens can be dug out from under the roots of large trees or piles of large rocks. These dens are usually



located on north and east-facing slopes in areas dense with Gambel oaks or conifers. Generally, black bears tend to avoid large open areas.

Black bears are omnivores and opportunistic, feeding largely on vegetation. Seventy to 80% of the black bear's diet consists of available roots, tubers, bulbs, berries, succulent leaves of hardwoods, grasses and nuts such as acorns. As much as 20% of their diet may consist of amphibians, reptiles, small mammals, fish, ants and other insects. Another 10% of the bear's diet may be carrion, such as winter-killed animals.

The Utah Wildlife Code has included the black bear as a protected wildlife species since 1967. Seasons for hunting bears were first established in 1969, and since then bear hunting has been regulated by the Utah Wildlife Board. Habitat quality (with emphasis on availability of spring forage and abundance of preferred foods in the fall, especially acorns and chokecherries), population information, human impacts on available habitat, depredation occurrences and hunting history are considered when setting harvest regulations. DWR and WS investigate occurrences where bears are suspected of killing livestock. All cases of depredation must be confirmed as bear-caused before trained personnel from WS are authorized by DWR to remove the bear.

*Assessment Area Considerations:* In the assessment area, an estimated 40% of livestock losses can be attributed to bears. WS control of bears is targeted and intended to control depredating behavior, not necessarily to reduce the numbers of bears in the area. Only those bears that repeatedly depredate livestock are removed, and on average, only 1 of 5 bear complaints result in removing a bear.

### Utah Prairie Dog

*Reference Conditions:* The Utah prairie dog was downlisted from endangered to threatened, in May 1984, and is being managed under the Utah Prairie Dog Recovery Plan and Interim Conservation Strategy.

This species is endemic to southwestern Utah, occurring in the southern Bonneville Basin and the high-elevation plateaus of central Utah, below 9,000 feet elevation. Permanent Utah prairie dog colonies always are associated with areas that provide moist vegetation throughout the summer. The nutritious, succulent plants found in such areas are crucial for Utah prairie dogs, as colonies without such vegetation are decimated by drought. Most Utah prairie dogs now inhabit either densely populated colonies which have alfalfa, or sparsely populated colonies on high plateaus.

According to some researchers, Utah prairie dogs covered an 1,846 square mile area in the 1920s. Since that time there has been an 87% decline in the area occupied and their ranges are limited by dense vegetation, possible competition with Uintah ground squirrel, topography, and winter climate. Of the original 57 prairie dog towns in south-central Utah, only 39 are left, with greatest reductions occurring on private lands. Possible reasons for their decline are intentional control efforts, predators and disease, as well as interspecific competition. Utah prairie dog numbers seem to be continuously fluctuating

back and forth between relatively stable and dangerously small populations, suggesting a delicate carrying capacity between prairie dog numbers and sufficient forage.

A significant decrease, from about 8,500 to 4,300 adults, occurred between 1970 and 1972, attributable to poisoning and concurrent drought. Some researchers considered the drought more detrimental than the poisoning, as prairie dogs in higher elevations (8,800-9,300 feet) did not feel the effects of the drought as much as on the lowlands. Bubonic plague is a suspected culprit for the decline that occurred in 1983. The total number of Utah prairie-dogs has fluctuated between 3,500 and 6,000 adults since 1991.

Utah prairie dogs live on south central Utah's steppe and get most of their water from plant moisture and possibly from dew. Thus, water availability to plants is a more important element of the habitat than free water for drinking. Irrigation and wet meadows are positively associated with Utah prairie dog abundance and occur more often at lower elevations. Some biologists believe that the precipitation pattern in south-central Utah has directed this prairie dog's vegetation preference to forbs and grasses. Water is probably most essential in the spring, so Utah prairie dogs have adapted and prefer forbs at this time.

Good habitat for the Utah prairie dog means low shrub density with a high grass and forb density. Plant diversity is important to the survival of a Utah prairie dog town. Droughts have occurred in south-central Utah and prairie dog towns with a more diverse plant community seem to have survived better. Utah prairie dogs need deep and highly permeable soils for their burrows, which provide protection from extreme temperatures and some predators.

*Assessment Area Considerations:* Management considerations for the Utah prairie dog are part of allotment management plans for BLM permittees that winter their sheep on BLM allotments. Management strategies for Utah prairie dogs result in improved range conditions that also benefit grazing operations, such that there is minimal conflict between Utah prairie dog management and winter sheep grazing on BLM allotments.

### Desert Bighorn Sheep

*Reference Condition:* Historical records of the first white men in the state confirm the presence of bighorns. Rocky Mountain bighorn sheep are generally recognized to have inhabited northern and central Utah and desert bighorns were found in southern Utah. Some mixing and interbreeding of Rocky Mountain and desert bighorns likely occurred where their ranges converged, making a clear distinction of historic ranges difficult.

Following pioneer settlement, native populations of bighorn sheep were nearly extirpated. Factors contributing to their decline included competition with domestic livestock for forage and space, vulnerability to diseases of domestic sheep, degradation of habitat caused by conversion of native grasslands towards shrub lands due to excessive grazing and fire suppression and unregulated hunting. While some herds of desert bighorn sheep suffered early extirpation, others remained relatively unexploited until the 1940s and 1950s when uranium was discovered on the Colorado Plateau. Mining operations opened

access to remote areas and drove desert bighorns from their traditional ranges. In addition, miners and prospectors hunted bighorns for food and sport despite the fact they were legally protected. By the 1960s, only a small population of desert bighorns remained in Utah along the most remote portions of the Colorado River.

Utah has been involved in an aggressive program to restore bighorn sheep to their native habitat since the late 1960s. Desert bighorns were first relocated to areas of historic habitat in 1973 in Zion National Park. Between 1979 and 1999, over 500 desert bighorns were trapped and released into areas of historic habitat. Extensive historic bighorn habitat occurs throughout the state. However, not all habitat is currently suitable for reestablishment of bighorn populations. Vegetative changes, human encroachment and continued grazing by domestic sheep make some areas unsuitable for bighorn restoration.

Bighorns are sometimes referred to as a wilderness species because of the naturally remote and inaccessible areas they inhabit. Bighorns prefer open habitat types with adjacent steep rocky areas for escape and safety. Their habitat is characterized by an open landscape and stable plant communities in which grasses predominate. The diet of bighorn sheep is primarily grasses and forbs, although they also utilize shrubs depending on season and availability.

*Assessment Area Considerations:* There currently are no bighorn sheep within the assessment area, but available habitat is occupied by the Zion herd about 9 miles south and west. There are no identified concerns or conflicts between domestic sheep operations on private or BLM lands and the Zion herd. However, suitable, unoccupied habitat north and west of the assessment area will not have reintroductions as long as current domestic sheep operations are active.

### **General Wildlife Relationships to the Assessment Area**

Pure aspen stands on high elevation meadows are experiencing a general decline across the assessment area and can be characterized as decadent clones. Among the decadent clones, some have substantial regeneration and recruitment while others have little or no regeneration. This wide-scale decadence is giving rise to a new single-aged dominated landscape. Many of these clones are showing significant mortality and are succumbing to a variety of insects and diseases. Stands lacking in regeneration have been observed converting to sagebrush and grass/forb communities over the past 10 years. In the absence of vegetative treatments or fire, clonal conditions are expected to continue to decline. Concurrent with the declining health of the aspen clones, there would be a reduction in current wildlife habitat values.

The assessment area provides summer range for deer and elk, and aspen provides both forage and cover for these species. On summer range, a forage:cover ratio of 60:40 is optimal and current conditions in the assessment area are estimated to be 50:50. While summer range conditions are considered generally good, a continuing aspen decline would result in decreasing available cover and forage, resulting in a continuing degradation of summer range. This is particularly true if the summer range is also a production area where cover is especially important for elk calf and deer fawn survival.

Improved forage conditions are also desirable, as current available foraging habitat is below optimal levels, and summer range is shared with competing livestock. These declining habitat conditions are further aggravated by increasing development within the area, with its concurrent loss and fragmentation of habitat and increased human disturbances.

There are opportunities to treat aspen stands that would maintain and improve wildlife habitat conditions. Treatments that would improve aspen regeneration and recruitment, would also improve forage:cover ratios for deer and elk. In addition to recovering aspen stands, there would be an expected increase in quantity and quality of grass and forbs, benefiting deer, elk, turkey and other insect foraging avian species, and consequently, improving goshawk and peregrine hunting.

Treatments in aspen stands would require that they be conducted on a large enough scale that new growth would not concentrate deer, elk and domestic livestock that could impair aspen recruitment through overgrazing.

In the assessment area, building of permanent and seasonal homes is increasing. As development proceeds, wildlife habitat is lost, both in quantity and quality. Continued development in the area brings pressure on owners of remaining large, agricultural lands to develop their property.

Development footprints not only cause direct loss of habitat, but incur impacts that change wildlife use of remaining habitat. Some species may be driven from the general area, while other species may become habituated to human activities, resulting in an increase in human/wildlife conflicts. Such consequences usually hurt wildlife more than humans, generally resulting in an animal's persecution and/or demise. This is particularly true for large predators, as trapping and transplanting "problem" bears or mountain lions usually is not a viable option because there may be no available release sites, they may return to the area if they are relocated, or may not be able to successfully adapt to where they are released because the habitat is already occupied or otherwise unsuitable. Deer and elk may also become problematic, consuming landscape plantings and becoming a general nuisance.

Often, deer and elk numbers increase and are artificially maintained through feeding by well-intentioned individuals. This concentrates deer and elk numbers and makes them more vulnerable to disease, winter kills, and predation. It also may result in increased conflicts with agricultural property owners, as range lands may serve as concentration sites for deer and elk, adversely impacting range conditions, potentially drawing in predators, and sometimes damaging fences.

Development also means increased roading, which not only increases habitat loss and human disturbance, but provides a vector for unwanted species invasions, such as noxious weeds and avian pest species. Noxious weeds can adversely affect wildlife habitat by overtaking native plant species and by converting diverse habitats to mono-species habitats that have little or no wildlife values. Avian pest species, such as brown-headed cowbirds that parasitize migratory bird species, have new access for dispersal into

habitats they have not previously occupied and can displace or decimate native bird species.

Changing demographics in the Cedar City area, as in many rural areas throughout the west, are not only changing land use patterns from agricultural to residential, but are shifting attitudes towards the environment and how it is valued. Specifically in regards to wildlife, appreciative use values, such as watchable wildlife, are becoming more prevalent, and there is less understanding and acceptance of utilitarian uses, such as hunting. Non-use values may also incline some individuals to low tolerance for agricultural practices as well. Such attitude shifts may contribute to converting agricultural land to residential or other uses that degrade wildlife habitat values.

There may be a change in public expectations of the DWR to shift management from game species to watchable wildlife species, such as birds. In response to changing wildlife values, DWR may broaden or re-prioritize management objectives and program funding allocations, which can result in public outcry from more traditional users, such as hunters who typically fund state agency wildlife programs from license revenues and taxes on hunting equipment through the Pittman-Robertson Act. These competing demands on state wildlife agencies have an upside, in that wildlife management has moved from a species-specific focus toward biodiversity and ecosystem management, and has broadened funding sources to encompass both consumptive and non-consumptive user groups.

Both hunters and bird watchers have become a constant revenue stream source, not only for agency funding, but also for private landowners. Watchable wildlife opportunities can generate revenue for private landowners as well as guided hunts or hunting leases. And through conservation easements, the inherent wildlife value of land can be as profitable as development rights, while preserving traditional agricultural uses and keeping the ranch in the family.

## **Recreation**

### **Historical Recreation Conditions**

The greater portion of the information integrated into the recreation section was extracted from the Dixie National Forest Management Direction Package (*in prep.*), the Forest Service Master Development Plan Brian Head Resort (USDA 2003), the South Spruce Ecosystem Rehabilitation Project Recreation Resource Report (USDA 1997), and Utah Centennial History information (Utah Centennial 1999). These sources were used in the absence of recreation information specific to Cedar Mountain and to establish a context of increased recreation pressure on the assessment area.

A change in leadership in 1910 led to new National Forest policies regarding forests as places for recreation. People had a natural attraction for the outdoors and ventured out to enjoy the mountains and forests. The Forest Service intended to advocate and promote recreational interests by actively planning and managing for recreation opportunities. To assure that these opportunities appropriately fit in with other uses, the Forest Service needed to establish parameters to assure a smooth working multiple use philosophy.

This interest in recreational management of the forests concurred with an expanding awareness of southern Utah's scenic attractions and a national interest in setting aside land for national parks and monuments. Grand Canyon National Monument was established in 1908, and Muktuntuwep National Monument in Zion Canyon was created in 1909. While the establishment of parks required development of the infrastructure, local citizens were already accessing the forests with horses and wagons, and enjoyed picnicking, camping, summer homesites, hunting, boating and fishing.

Forest supervisors were encouraged to develop recreational programs. They were also told to ensure the preservation of the spectacular, rugged landscape while coordinating grazing management, fire protection, and sanitation without creating conflict. Of course, coordinating this multiple use concept required some trial and error, and some circumstances could not be foreseen.

Unrestricted hunting before 1911 led to extreme shortages of wild game, especially deer. Coordinating with the state fish and game agency, the new National Forests in southern Utah were closed for five years, and the deer herds quickly increased. After this desimation, hunting and fishing licenses were required along with other regulations; however, this increase in herds caused the stockmen to complain that deer herds were causing range damage. This issue of game management put the Forest Service in a precarious position between the stockmen and sportsmen.

In 1919, the Sevier Forest was eliminated, and its West (Markagunt Plateau) and East (Paunsaugunt) divisions combined became the Dixie National Forest (NF). The years between 1919 and 1928 became even more important with the realization of recreational potential for forests and natural scenic attractions in southern Utah.

Recreational development expanded with the Union Pacific (UP) railroad spur into Cedar City and the construction of accommodations by UP's Utah Parks Company at Zion Park, Cedar Breaks, Bryce Canyon, and Bright Angel Point on the Grand Canyon's North Rim. Recreational development was promoted by the Cedar City Commercial Club, acting like a modern day Chamber of Commerce. The Forest Service also encouraged recreation in significant ways, and Dixie National Forest Supervisor William L. Mace was the president of the Commercial Club from 1921-1922.

The Forest Service administered Bryce Canyon until 1928 and Cedar Breaks until 1933. The Forest Service built roads and trails, a campground, and parking turnouts at points of interest. Eventually Cedar Breaks was turned over to the National Park Service (NPS) as a National Monument after three years of interagency disagreement over whether it should be attached to Bryce Canyon or Zion National Park. Even after Bryce Canyon and Cedar Breaks were transferred to the NPS, recreational use on the Dixie NF continued to expand.

There was a contingent who thought that the NPS should administer all federal recreation land, but the Forest Service contended that recreation was an important component in national forest management. The New Deal created the Civilian Conservation Corps (CCC), a program that was most beneficial to public lands. In 1933, the CCC crews built miles of roads and trails that opened up the forests for timber harvesting, fire fighting and increased recreational use by hunters and hikers. After 1935, recreation users found campgrounds with toilets, horseshoe pits, tennis courts, volleyball courts, etc., at Navajo Lake, Pine Valley, Aspen Mirror Lake, Panguitch Lake, Mammoth and Duck Creeks, Brian Head, Blowhard Point, and Vermillion Castle.

During World War II, recreation and conservation were deemphasized as employees were called to duty and funds became scarce. Recreational facilities fell into disrepair as grazing and timber resource management increased with a shift in national priorities.

In 1944 the Powell and Dixie National Forests were combined to become the Dixie NF, and because it was shown that the forest could be more economically administered in a central location, the Supervisor's Office was placed in Cedar City despite protests from livestock grazers in other counties. In 1946 President Harry S. Truman combined the Grazing Service and the General Land Office, to create the Bureau of Land Management (BLM) who also situated their office in Cedar City.

During the 1940s and 1950s, public land managers tried to balance the demands of the public looking for recreational areas, with the needs of people living on or adjacent to the public lands and forests, and who derived their living from these lands. This balancing act has continued through the succeeding decades and continues today. Recreation has expanded way beyond hunting, fishing, hiking, and camping, to include viewing scenery, birding, rock climbing, biking, off-roading with two, three and four-wheeled vehicles, and the winter sports of cross-country skiing, snowboarding, and snowmobiling. Private

mountain homes tracts of various acres, provide accommodations on Cedar Mountain for visitors who do not live year round in Iron County. Recreation and tourism play a major role on the public lands of Iron County, but other users, particularly private land owners, still play a prominent role in the county (all historical information extracted from Utah Centennial History Suite, 1999).

### **Current Recreation Conditions**

Utah State Highway 14 has been designated a Utah State Scenic Byway and a National Forest Scenic Byway, and is frequently chosen as a scenic travel route by visitors touring southern Utah. Many national and international visitors travel to and through the Cedar City area, the following National Parks, National Monuments, lakes and other natural areas: Bryce, Zion, and Capitol Reef National Parks, the Grand Staircase-Escalante and Cedar Breaks National Monuments, Duck Creek Campground and Visitor Center, Duck Creek Village, Brian Head Town and Ski Resort, Ashdown Gorge Wilderness, the Panguitch Lake area, Yankee Meadows Reservoir area, the Navajo Lake area, and Kolob Reservoir.

Data from a permanent traffic recorder on Highway 14 east of Cedar City recorded 779,917 vehicles traveling Highway 14 in 1997. This is 24% increase over the 629,147 recorded in 1993. Approximately 1,832,800 people traveled along Highway 14 using the Cedar Breaks factor of 2.35 persons per vehicle. The primary use is during June through October as illustrated in the Table 11 below.

Table 11. UDOT Traffic Counter - Highway 14

MONTH	1993	1995	1997
January	16,182	22,072	23,808
February	26,068	24,696	23,856
March	22,475	26,381	34,596
April	27,450	31,680	34,020
May	46,903	56,761	73,935
June	73,650	73,170	96,930
July	114,886	120,683	129,239
August	102,610	112,716	124,031
September	81,930	92,550	89,460
October	61,845	78,988	78,616
November	30,720	33,030	38,070
December	24,428	27,001	33,356
Total	629,147	699,728	779,917

Besides State Highway 14, State Highways 143 and 148 are also frequently chosen as scenic travel routes by visitors touring southern Utah to access national parks, national monuments, and other natural areas. All three highways have been designated Utah State Scenic Byways and National Forest Scenic Byways.

Highway 143 is a primary access route for Cedar Breaks National Monument, Brian Head Peak, and passes through Brian Head Town and Ski Resort. Highway 143 also and



provides access to Highway 148 and Panguitch Lake. In 1996, Utah Department of Transportation (UDOT) estimated that 642,400 vehicles traveled this section of Highway 143. This is a 23% increase over the 1991 estimate of 524,000 vehicles. Traffic counters at the north boundary of Cedar Breaks National Monument on Highway 143 recorded 217,943 vehicles between June and October, 1996. No data are available for November - May because the Park Service removes these counters during the winter months. A 1994 survey conducted by the National Park Service, found that there are an average of 2.35 persons per vehicle visiting Cedar Breaks. Applying this multiplier factor to UDOT's estimates, there were approximately 1,510,000 people traveling along Highway 143.

Table 12. Cedar Break National Monument - Monthly Vehicle Totals (1995-1997)

Month	Vehicle Totals		
	1995	1996	1997
June		73,403	70,231
July	116,449	84,671	94,619
August	98,166	89,558	96,198
September	76,541	98,234	90,752
October	53,048	53,885	70,717

(Based on Boundary Traffic Counters on Highways 148 and 143)

Seasonal travel patterns are reflected by Cedar Breaks National Monument entrance vehicle counter totals, and data from a permanent traffic recorder on Highway 14 east of Cedar City. The Highway 14 counter patterns also do not represent the impacts of Brian Head Ski Resort, because Highway 148 is closed during the winter months. As a result, the winter traffic represents a higher percentage of the total traffic volume on Highway 143 than it does on Highway 14.

The Dry Lakes Road (#265) has been designated a Utah State Scenic Backway. This road is maintained by Iron County as an all weather gravel - native surface road, and is plowed by Iron County during winter months. Activities along this road include driving for pleasure, access for summer home areas on private land, access for hunting, mountain biking, snowmobiling, and cross-country skiing. This area is designated open to off road vehicle travel.

Other primary travel routes include Sidney Valley and the Center Creek Roads (#048), the Bowery Creek road to Yankee Meadow Reservoir (049), Bear Flat Road (#304), Brian Head Peak Road (#047). Secondary travel routes include Radar Ridge (#277) Sage Valley Road (#240), and the Red Desert Road (#051). These roads are all native or gravel surfaced roads.

There is a network of roads within the Brian Head Ski Resort permit boundary for servicing the lifts and snowmaking ponds, and to provide access to ski runs for grooming. These roads are closed by the Dixie National Forest Travel Plan to vehicle traffic except as necessary for resort administration. These roads are used as trails by hikers and mountain bikers during summer and fall months. This use is promoted by Brian Head

Town and Brian Head Ski Resort and this road system is considered part of the area trail network.

Recreation use on the Cedar City Ranger District has steadily increased, especially from residents of Las Vegas, Nevada, St. George, Utah, Phoenix, Arizona, and southern California. Fifty percent of Clark County, Nevada (Las Vegas area) residents surveyed in a 1994 random telephone survey indicated that they had visited the Dixie NF in the previous two years (A & A 1994). Clark County is currently the fastest growing metropolitan area in the country with an estimated 1,485,855 residents in 2001.

Cedar City and the Cedar Mountain area is understood to be a popular recreation area for many Clark County residents, and Clark County residents who also own several properties in area subdivisions. Recreation activities include: viewing scenery, watching wildlife, motorcycle and OHV riding, mountain biking, horseback riding, camping, hunting, snowmobile use, cross-country and downhill skiing, hiking, fishing and boating.

The population of Iron County was estimated to be 33,779 in 2000, according to the Utah State Governor's Office of Planning and Budget. The population of Cedar City was estimated to be 23,838 in 2004, and is projected to grow to a population of 39,806 by 2030.

The Forest Service uses the Recreation Opportunity System (ROS) to match visitor's desires, abilities, and expectations to a particular activity and setting. ROS provides a framework for stratifying and defining classes of outdoor recreation environments. The continuum of this spectrum is defined in terms of perceivable modifications to the natural environment, such as presence of roads and trails, or the existence of buildings, facilities and conveniences. Also considered in the evaluation of a setting are social factors such as remoteness, size of the space, evidence of human activity, social encounters and managerial presence. The ROS bases its premise upon several philosophies:

- People purposefully choose settings for their recreation activities.
- Choices realize the expectation of achieving particular recreation experiences.
- It is desirable, from a macro-planning perspective, to present a diverse spectrum of activity and recreation setting opportunities, ranging from highly developed to primitive, from which people may choose.

According to the Forest Plan (1986) and the ROS framework, corridors along Highway 14, roads FS058, FS067 and FS068 have historically been managed for roaded recreation opportunities and for management activities that are not evident or are visually subordinate to the natural character. Current direction for those corridors is a Scenic Integrity Objective of High. Therefore, the natural character and scenic integrity along most of the open roads within this area provide an attractive setting for recreation, consistent with a Roaded Natural ROS designation.

Private residential developments on Cedar Mountain, related utilities and encounters with other recreationists are on the increase. This influence shifts more developed and heavily used areas toward a Rural opportunity classification. More remote portions of the area are consistent with a Semi-Primitive recreation opportunity setting and visitors usually experience fewer encounters with other users.

Dispersed motorized recreation use has developed considerably in the Cedar Mountain area. This area has become very popular with recreationists from Las Vegas, the Salt Lake area and local communities. Adjacent private property has been purchased by people who value forest recreation experiences. A sizable number of those property owners place a high value on the nearby ATV access, as represented in recent public participation. Growth in demand for OHV (off-highway vehicle) use and other dispersed motorized recreation has increased, which is reflective of similar demand in other areas of the United States, particularly the west. Southern Utah is also recognized as a destination for OHV recreation activities, as well as non-motorized forms of recreation.

#### ATV and Motorcycle Use

The area includes primary roads for dispersed road and trail related recreation. These include arterial plus collector roads. ATV's and off road motorcycles are used on many of the primary and secondary native and gravel surface roads. Within the analysis area this includes the Sidney Valley and the Center Creek Roads (#048), the Bowery Creek road to Yankee Meadow Reservoir (049), Bear Flat Road (#304), Brian Head Peak Road (#047), Sage Valley Road (#240), and the Red Desert Road (#051). The roads constructed for the former Deer Valley, Blowhard, Sage Valley, Hancock and Lowder State timber sales are frequently used for ATV and motorcycle travel. Off road motorized vehicle travel is prohibited throughout the analysis area.

The 8.5 mile Duck Creek ATV trail system #3221 is also located near the project area. Other trails include the Lost Hunter Trail #3212, the Old Ranger Interpretive Trail #3203, and the Singing Pines Interpretive trail #3202, all located in the area. Mountain biking has also been steadily increasing within the area.

#### Mountain Biking

Mountain biking, according to the Forest Service, has been steadily increasing within the project and adjacent areas. The Brian Head Town and Ski Resort have been actively marketing to this user group, developing a mountain bike guide and trail map, building trails within the resort permitted area, and developing a trail network within the town. Two mountain bike festivals, in July and September, and two mountain bike competitions in August and September, are events that are operated under a special use permit with the Dixie NF. These events all cross the assessment area.

Brian Head Resort operates Chairlift Two during the summer for sight-seers and mountain bikers. There are two businesses in Brian Head that operate shuttle services for

mountain bikers to over 200 miles of single-track trails: Brian Head Resort Mountain Bike Park and Activity Center and Georg's Bike Shop.

Panquitch Lake is popular for mountain biking and hiking trails that originate in the Brian Head area and pass through or terminate in the Panquitch lake vicinity. There are also people who pass through the assessment area while traveling on Highway 143 to Panquitch Lake.

The Bunker Creek/Sidney Peaks trails received the most use, with 582 people being shuttled from Brian Head to the Sidney Valley road (Forest Road #048) and being returned to Brian Head from the terminus near Panquitch Lake. The Dark Hollow trails received the second most use, with 303 people shuttled from Brian Head Town, to the top of Brian Head Peak, and returned from the terminus in Parowan. Five businesses in Brian Head rent and sell mountain bike equipment. Brian Head Cross Country reports a 400% increase in mountain bike rentals, from 260 in 1991 to 1062 in 1994.

### Road and Trail Use

There are over 20 motorized trails totaling over 500 miles (most of this system is a mixed-use portion of the classified road system), and over 1,000 miles of non-motorized trails. In addition to the motorized and non-motorized trail system, the Dixie NF has an extensive Wilderness trail system including 21 trails and 143 miles of trail. Trails within the area receive heavy to moderate use throughout the summer and fall season by hikers, mountain bikers and horseback riders. Non-motorized recreation activities such as mountain biking, horse use and hiking occur on the Virgin River Rim trail #3211, the only primary non-motorized trail located within the area. This trail is one of the highest use trails on the Cedar City Ranger District.

Primary use trails in the area include: Brian Head Town and Resort trails, Sidney Peaks and Lowder Ponds trails, Left and Right Forks of Bunker Creek, Virgin River Rim trail, and Left and Right Forks of Dark Hollow trails. These trails are the highest use trails on the Cedar City Ranger District. The Sidney Peaks, Bunker Creek and Dark Hollow trails have received regional and national attention in mountain biking and travel magazines. The primary trails for the Ashdown Gorge Wilderness are Blow Hard, Rattlesnake, High Mountain and Twisted Forest trails. Secondary trails include the Hancock Peak, Navajo Point and Spruces trails. The Spruces and Hancock Peak trails currently have low use compared to other area trails, and offer users a semi-primitive non-motorized experience, including opportunities for solitude and a sense of remoteness from others. The last 1 and ½ miles of the Hancock Peak trail passes the Meadow Lakes subdivision and the old Hancock Peak timber sale. In this area the sense of solitude and remoteness from the sites and sounds of humans is greatly reduced. Only hiking and horseback riding is permitted in the Ash down Gorge Wilderness.

## Camping

The Dixie NF manages 31 campgrounds and picnic areas, with about 1,500 inventoried dispersed campsites. Duck Creek Village and the Forest Service's Duck Creek Campground are located 28 miles east of Cedar City on Highway 14. It features ninety-six single-family units and two multi-family units. Services include culinary water, six flush toilets, and a trailer dump station. There are also popular dispersed camping sites adjacent to many roads within area, with moderate to heavy dispersed camping use throughout the summer. Several sites are especially popular for dispersed camping during the fall hunting season.

The more popular dispersed camping sites include: Upper Bear Flat, Yankee Meadows Reservoir (popular for boating and fishing), Long Valley, Deer Valley, Sidney Valley, Red Desert and Sage Valleys. Dispersed camping on public lands is permitted adjacent to most roads. There is moderate to heavy dispersed camping use throughout the summer. The Deer Valley, Red Desert and Sage Valley areas are especially popular for dispersed camping during the fall hunting season.

Navajo Lake is also popular for boating and fishing. There are three developed campgrounds in the Navajo Lake basin, Spruces, Te-Ah, and Navajo Lake, and includes special use permit recreation facilities for lodging and boat landings.

Cedar Breaks National Monument is a popular scenic area, and includes one developed campground. Tourists will often visit the area while en route between Zion and Bryce Canyon National Parks, and the Escalante Grand Stair Case National Monument.

## Winter Recreation Use

Snowmobiling and cross-country skiing are the most popular winter recreation activities that occur within the area although use is not heavy when compared to areas well known for snowmobile opportunities. The junctions of Strawberry Creek road #058 and Swains Creek road #060 are a snowmobile trailhead and parking area. Mammoth Creek, Strawberry Valley, Swains Creek and Lars Fork are the most utilized snowmobiling areas. Cross-country skiing is also a popular winter sport, and use occurs on various roads and trails as a dispersed recreation activity.

A snowmobile route has been proposed that will be groomed by Utah State Parks and Recreation, linking the Brian Head area with the Panquitch Lake and Duck Creek systems. Utah State Parks and Recreation grooms trails along the Red Desert (#051) and Sage Valley (#240) Roads. Midway Valley (at the Highway 14-143 Junction) is a major snowmobile trailhead. Another major snowmobile trailhead is located at the Navajo Lake junction. Cross-country skiing is another popular winter sport, with designated trails in the Brian Head and Cedar Breaks National Monument area. Highway 148, which is closed during the winter, is a popular snowmobile and cross country skiing travel route.

### Brian Head Ski Resort

A portion of the Brian Head Ski Resort is under special use permit with the Dixie NF. The resort operates 8 lifts and 50 runs on 500 acres of skiable terrain. During the 1996-97 ski season 148,306 skier days were recorded. Use has been relatively stable since 1990, averaging 150,000 skiers per season.

The Brian Head Resort proposed an expansion which includes the construction of three new lifts and associated runs on U.S. Forest Service System Lands. This expansion was approved in 1997, and upon completion will support up to 250,000 skiers per season.

The resort has extended their lift operation into the summer and fall seasons to accommodate mountain bikers and sightseers, operating Giant Steps Chair Lift #2. In 1994 there were 1453 tickets sold for mountain bike users, and 3167 sightseers and hikers used the lifts. This is a 38% increase over the use in 1993 (the first year the lifts were operated during the summer.)

Table 13. 1994 Summer Lift Use

	MAY	JUNE	JULY	AUGUST
Mountain Bikes	33	679	397	344
Sightseers	156	1549	722	740
Total	189	2228	1119	1084

There is lodging available as part of the resort development in Brian Head Town. The Cedar Breaks Lodge receives the highest use during the ski season (December - March) and the summer season (July and August). Bus tours account for a significant portion of the summer use.

### Brian Head Peak

Brian Head Peak is the second highest point on the Dixie National Forest at 11,307 feet. A gravel road provides access to an overlook at the top, providing scenic vistas hundreds of miles in every direction. A rock lookout structure was constructed during the 1930's by the Civilian Conservation Corps (CCC). There is heavy visitation during the summer. Use is moderate to light during the fall and winter, with the only winter access being on snowmobiles or skis. The Brian Head Ski Resort operates a snowcat during the winter to transport advanced skiers to the peak, to facilitate skiing the chutes on the north face of the peak.

### Brian Head Town

There are 130 permanent residents living within the city limits of the Brian Head. There are 70 developed lots within the city limits. However, there are many vacation homes built within Brian Head Town and nearby subdivisions and private lots. According to

Iron County property ownership records, there are approximately 600 private land owners in or near the Brian Head Town. Many of these lots have not yet been developed.

The primary industry for Brian Head Town is tourist related service industries. In addition to the services provided by the resort there are 7 lodging accommodations consisting of hotels and condominium rentals. There are also 4 restaurants and 5 sporting good shops that rent and sell skiing and mountain biking equipment.

Visitation has been increasing during the summer and fall months. The quarterly resort and sales tax collection reported by Brian Head Town for June - November has increased by 563% between 1986 and 1996. The community has been actively promoting summer visitation through sponsorship of recreational events and festivals

### Hunting and Fishing

There is concentrated hunting use in this area during the general season deer and elk hunts in areas south of Highway 14 and a limited entry elk hunt in areas north of Highway 14. A limited entry antelope hunt occurs in areas north of Highway 14, turkey hunting occurs on both sides of the highway and waterfowl and upland game bird hunting also occurs within the project area. Ruffed and blue grouse are hunted along the rim areas.

Popular fishing sites include: Duck Creek Reservoir, Duck Creek, Aspen Mirror Lake, Navajo Lake, Yankee Meadows Reservoir and Kolob Reservoir. There is also fishing in Lowder Creek and Ponds, Mammoth Creek, Bunker Creek, Castle Creek and the Virgin River.

### Private Subdivisions/Vacation Home Sites

Private residences, both primary and secondary homes, are located within the area in subdivisions including Duck Creek Village, Strawberry Valley, Swains Creek, Zion View, and Cedar Mountain. There are secondary recreation residences on private lands in the Rainbow and Meadow Lake Subdivisions, and areas adjacent to Brian Head Town.

A few of the homes in these areas are used as primary residences. Duck Creek Village offers all amenities, including three stores, gasoline, lodging, and ATV purchase and rentals.

### **Future Recreation Conditions**

Prehistoric, historic, current residents and communities near the forests have strong ties to the land. Economic linkages include but are not limited to wood for homes and fuel, water, forage for livestock, and food sources. Social linkages include recreation, traditional activities, family events, and an intangible feeling of interest.

An increasing number of local and regional residents rely on the forests for recreation

opportunities and resources in ways that are not always compatible. The increased popularity of motorized recreation on, and off, existing trails has generated conflicts in use that have decreased the availability and the quality of non-motorized opportunities.

Population growth and migration in the American West have increased demands on the forests and private land. Increased visitor use of these forests and private land is putting pressure on the landscapes, wildlife, and vegetation that depend on these lands. Local use of these forests has increased. However, much of the new use has come from population centers like Las Vegas and the Wasatch Front. In addition to the increased use of the forest, lands adjacent to the forests that once helped maintain natural systems are being developed for residential and commercial uses. The development of lands adjacent to the forest has increased concern about WUI fire risks and encroachment on key wildlife habitats.

A wide variety of opportunities are available for both private and commercial recreation. The opportunities continue to be widely available to local, regional, and national visitors. These opportunities are in harmony with long-term resource sustainability, and the opportunities include, particularly for private landowners, Bed and Breakfast Inns, Dude Ranches, private campgrounds and RV parks, and contracted small and big game hunts. Incompatible uses must be zoned to appropriate locations.

Technological advances have changed the day-to-day activities of forest visitors and the way people recreate. These changes have also affected impacts on the forests. Changes in motorized technology have increased the ability of humans and machines to go to remote places. Larger and more powerful ATVs and snowmobiles are available. In addition, the advent and popularity of cell phones has created additional demand for electronic sites. Technology is constantly changing and it is a challenge for the forests to address the demands that new and unforeseen advances in technology may bring.

One trend we anticipate is a steady increase in visitors from neighboring states (Arizona, Nevada, and California) and from the Wasatch Front, Utah. We expect to see an increase in general summer use, hunting, and motorized winter recreation use. Accompanying this use, we are seeing an increase in private property ownership in areas adjacent to the Dixie NF. Off-Highway Vehicle (OHV) use has seen an increase in recent years, and use will continue to rise. There is a noticeable increase in encroachment by this use into primitive areas of the Dixie NF.

Mechanized uses such as mountain biking are very popular. The forest expects a rapid increase as some areas on the Dixie (Cedar Mountain, Brian Head, and Red Canyon) are becoming internationally renowned for this use.

In some places, unmanaged dispersed recreation (dispersed camping and off-trail OHV use) threatens resources and other forest uses. There is a need to limit and mitigate these impacts. Many of the motorized and mechanized trail users seem to be seeking something other than a primitive experience, however, they still want space to roam and be alone on the Forest. Much of this use will continue to cluster around water resources. For Pine



Valley Wilderness, there may be challenge keeping motorized use off the non-motorized trails.

Since “driving for pleasure” and “viewing scenery/wildlife” are top visitor activities on the Dixie, we expect a greater need and emphasis on scenery management. The Dixie NF will improve their current visual management system by converting to a more comprehensive scenery management system. Public support will be needed to remove the beetle killed trees and the subsequent fire hazard.

The strategy over the next several years with regard to OHV use of trails revolves around the Forest policy of use on designated trails only. The management tools to be used include education, enforcement, and monitoring.

There is high, concentrated recreation use due to the number of private developments in the area, and the trend is expected to increase. The Duck Creek Area is about 55% developed. The current level of occupancy has the potential to nearly double in the coming years. The number of private developments with wells and septic systems may be affecting groundwater quality and lowering water tables, and could potentially increase or create soil instability.

The Dixie NF and Cedar Mountain diverse landscapes offer a variety of settings for a broad range of activities. These landscapes include primitive settings where there are opportunities for solitude, risk and challenge, to more modified settings where there are opportunities for social interaction, comfort, and less risk.

Local communities, partnerships and volunteers are actively involved and benefit from their roles in providing recreational opportunities. Recreation users understand the potential for impacts to resources and other users and actively assist in caring for the land and resolving conflicts.

The relatively open and remote landscapes of the public and private forests offer unparalleled recreation opportunities for their respective users that can provide both challenge and solitude. These opportunities span four seasons and include (but are not limited to) camping, hunting, backpacking, OHV use, and fishing. Quality recreation developments are strategically located at key destinations to accommodate concentrations of use and provide staging areas into the more remote parts of the forest.

The forests’ location near state parks, national parks, and national monuments suitably compliments and appropriately contrasts these internationally popular attractions. Key travel corridors link to these parks or monuments and associated outlying communities. Quality developed recreation opportunities are located along these corridors to highlight unique natural and cultural features. Emphasis exists on successfully accommodating the number and diversity of tourists visiting the area.

## Chapter 4: Synthesis

Three main themes emerged from the analysis of Cedar Mountain's biological and social resources: 1) changing demographics, 2) development, and 3) aspen. These themes are interconnected, and each of them will strongly influence the future of this landscape. The ability to influence the future of the landscape with regard to traditional uses, the nature of development and ecosystem integrity, will be increasingly difficult. In the absence of timely action, future management alternatives will decrease.

### Changing Demographics

Changing demographics in the Cedar Mountain Assessment Area, as in many rural areas throughout the western United States, are not only changing land use patterns from agricultural to residential, but are shifting attitudes about the land and its uses.

#### *Decrease in agriculturally-dependent communities*

- Large landowners managing the land in the family tradition are an aging population. Many desire the land to remain undeveloped. Changing professional interests of younger generations and increased agricultural costs, decrease the ability of younger generations to maintain the land agriculturally. High real estate values further tempt inheritors to subdivide the land.
- Land division of large parcels occurs on a smaller scale even among family members when what was previously one tract of land is distributed among multiple siblings over several generations.
- Increases in land values discourage young agricultural families from affording land.

#### *Increase in small lot and recreational homeowners*

- Subdivided land is increasingly being purchased for recreational use by people with little or no historical ties to the land, urban backgrounds, and from other states. Newcomer's attitudes toward traditional uses, such as hunting and grazing, can lead to conflicts.
- Increased opportunities for land investors or developers have increased the population sympathetic to development. New developments have increased the availability of small parcels.
- Large landowners who recently acquired land on Cedar Mountain may not depend on agriculture for their primary source of income. Land may instead be purchased as a partial investment with intentions to eventually develop some of the land.
- Drastic growth in the 3 counties encompassing the Cedar Mountain area creates challenges in providing additional infrastructure such as roads, bridges, snow removal, fire protection, and law enforcement. Infrastructure needs become permanent with the development of permanent, year-round neighborhoods such as those on the west side of the mountain.

#### *Changing demographics on wildlife resources*

- Wildlife values are shifting from utilitarian to appreciative uses, which result in differing opinions for wildlife management needs on the landscape.
- With changing wildlife values, there is a trend of declining state wildlife agency revenues from traditional sources, creating a need to identify and “tap” other user groups to support changes in agency wildlife management programs.
- Increasingly diverse expectations of agencies responsible for managing wildlife has led to a shift from single-species focus to biodiversity and ecosystem management.

### **Development**

In the assessment area, building of permanent and seasonal homes is increasing. Continued development in the area brings pressure on owners of remaining large, agriculture lands to develop their property. Good planning for future land-use is becoming critical.

#### *Water*

- All water rights are fully appropriated, making new appropriations to match the rapid population growth impossible. Transbasin transfers are not allowed. Interbasin transfers may occur if they do not incur the effect of a new appropriation. Such transfers would cause controversy.
- As development continues, water supplies may diminish and lower water tables. Prices for water use may rise as the demand for water increases.
- The potential for flooding and excessive erosion of fine soils in the area may be increased.
- Homeowners may face higher costs to meet regulations designed to mitigate soil movement due to water saturation. Septic systems may be prohibited in some areas to prevent possible contamination of downstream water sources.

#### *Community planning*

- Counties are receiving good revenues from secondary homeowners, making them increasingly important members of the county politics. Some secondary homeowners desire year-round services from the county, including year-round road access.
- The number of homes in the wildland urban interface is rapidly growing, subsequently increasing danger from fire. Grazing and natural processes reducing fuels usually cease upon development, further increasing fire hazard. Homeowners are at varying levels of awareness concerning concepts of fuels reduction and the need for defensible space.
- Development of roads and subdivisions serves as a vector for the spread of noxious weeds and non-native wildlife species, resulting in a decrease in wildlife habitat quality and displacement of native wildlife species.

#### *Effects of developing agricultural lands on existing natural resources*

- Development of roads and subdivisions could greatly reduce the use of agriculture and livestock use on the land. Most agricultural landowners still resist economic pressures to sell lands for development purposes, though changing demographics in younger generations may redirect family interests away from the land.
- Development will decrease the acres used for grazing on private lands, possibly resulting in increased demand for use of federal grazing lands.
- An increasing rate of development causes direct loss and fragmentation of wildlife habitat through building of homes and roads.
- As more development occurs in wildlife habitats, human/wildlife conflicts escalate and result in displacement and loss of wildlife, as property owners become less tolerant of “nuisance wildlife”.
- Development may affect continuous stands of aspen through fragmentation of the landscape. This would decrease the amount of shade available for livestock and wildlife. Loss of shading will decrease forbs and shrub forage.

### **Aspen**

The decline and future of aspen on the Cedar Mountain landscape concern landowners who largely appreciate the tree for its aesthetics, forage habitat and shade uses. Pure aspen stands on high elevation meadows are experiencing a general decline across the assessment area and can be characterized as decadent clones. Among the decadent clones, some have substantial regeneration and recruitment while others have little or no regeneration. This wide-scale decadence is giving rise to a new single-aged dominated landscape. Many of these clones are showing significant mortality and are succumbing to a variety of insects and diseases. Stands lacking in regeneration have been observed converting to sagebrush and grass/forb communities over the past 10 years. In the absence of vegetative treatments or fire, clones are expected to continue to decline.

#### *Wildlife issues*

- The area and its aspen stands provide summer range to deer and elk and foraging opportunities for peregrines and goshawk. Untreated stands would experience declines in quantity and quality of wildlife habitat, especially for deer and elk that use the summer range for fawning and calving.
- Treated stands would improve and maintain the varying successional stages essential for healthy aspen communities. Diversified stands would improve habitat for wildlife species adapted to aspen community types. They would also provide recruitment of young trees for long-term sustainability of stands.
- While increasing grazing opportunities through the growth of aspen suckers, grazing decreases sprout growth and densities.

#### *Grazing/forage issues*

- Aspen regeneration decreases short term grazing opportunities if exclusion practices are implemented (2-5 years or until out of reach of browsing sheep or

- deer). Many landowners believe fencing aspen stands has improved aspen regeneration on their land.
- Declining aspen could result in reduced forb communities that are shade dependent. Healthy forb communities are often desired for grazing.
  - Aspen decreases the spread of fire through their ability to sustain moist grass communities. Damage from wildfire is further reduced by absence of conifers within aspen stands and reduction of fuels via grazing.
  - Aspen stand decline may return dominance to shrubs and herbaceous vegetation.

#### *Treatment options*

- Aspen regeneration is dependent on disturbance. Fire, mechanical or chemical treatments provide opportunities to create this disturbance.
- Aspen treatment techniques vary in popularity among large and small landowners, depending on goals, objectives and values.
- The high percentage of defect and rot contained in over-mature aspen significantly reduces its merchantability and marketability. Furthermore, aspen in the Cedar Mountain area has little or low merchantability without local wood producers or mills.
- Aesthetics and timber values are lost permanently when stands die without regeneration.

Management opportunities available on Cedar Mountain will decrease in time due to changing demographics, increasing pressure to develop, and rapidly declining aspen. Generational change of traditional land users could quickly transform future ownership of what is still largely, undeveloped acreage to recreational and permanent subdivisions. Unplanned land fragmentation would hinder activities including agriculture requiring large, undeveloped space. Fragmentation would also hinder the ability to treat declining aspen at a large enough scale to sustain aspen stands in the long term. For these reasons, we conclude that timely management is urgent, as passive management may have consequences that will fundamentally change the area to an undesired condition.

## Chapter 5: Opportunities

As the group worked through this analysis, we wanted to leave interested stakeholders with information and suggestions for future management alternatives. This section is a compilation of potential opportunities, and some possible resources to continue in this direction. These opportunities fall into 3 broad categories.

### **Partnerships**

Private landowners have opportunities to enhance their property by participating in Federal cost share programs, which are administered by Federal and State agencies.

- Utah Division of Forestry, Fire and State Lands
- Natural Resource Conservation Service (NRCS)
- Division of Wildlife Resources
- National Forest Service

Forest Stewardship Plans are multi-resource management plans that will address the landowners primary objectives of prescribed burning, grazing, vegetation management, wildlife, recreation, and aesthetics.

### **Uniting Landowners with Common Natural Resource Goals**

Another opportunity for landowners is partnerships with other landowners in the area. Landowners with common goals can partner their lands together to result in larger acres treated in the landscape. Managing larger tracts of land will have greater resource benefits.

The aspen in the Cedar Mountain area has little or low merchantability without local wood producers or mills. Groups of landowners could form a co-op to explore marketing opportunities to utilize aspen, such as biomass, mills to produce small specialty products, and other wood products.

It's possible for landowners with a common resource vision to together partner with an appropriate resource agency to develop a common resource management plan.

### **Non-Traditional Ways to Keep Land**

With increased development and fragmentation within the area, retaining ownership and keeping the land intact can become increasingly difficult. Alternative solutions to fragmentation could include the following recreation alternatives on private land:

Hunting: Small and big game hunts: With the healthy population of turkey, deer and elk, landowners could provide access for hunting and retain fees.

Watchable Wildlife: There is a growing interest in watchable wildlife, not only deer and elk, but birds. There are unique birding opportunities in the local area, such as to see condors, that may be an attractive watchable wildlife opportunity, especially in conjunction with dispersed camping or bed and breakfast inns.

Dispersed Campsites: Identified dispersed sites leased and/or renewed on an annual basis. Require minimum infrastructure, can be adjusted as necessary, and listed with a third party for administration, cancelled if not working or expanded if working. Rules/regulations could be in agreement.

Horseback Rides: Public horseback rides on the mountain to vistas' and rims for a view of the scenic beauty and a look at a working sheep ranch. Could use existing livestock and corrals, and require more gear and possibly more livestock. Could be contracted.

Bed and Breakfast Inns/Homes: This provides the opportunity for a primitive setting where there is the potential for social interaction and accommodate a growing recreational need.

Land Easements and Land Leases: These are government funded programs that have become increasingly popular. Land easements and leases will protect the resource values while providing addition income to land owners. For additional information on these program refer to the appendix of this report.

## **Information**

Another grouping of opportunities consists of developing and disseminating critical information related to the various land management alternatives. For example, we found limited information on the implications of inter-basin water transfer. There is also a need for information on marketing and economics of non-traditional management activities and land management options. A resource for this information is the Institute of Outdoor Recreation and Tourism (IORT) at Utah State University.

Finally, we see need for research on the extent of aspen decline. There is need to identify (GPS) high-risk clones and to track decline and regeneration in order to prioritize treatment. We suggest Southern Utah University's GIS Program as a possible resource to accomplish this task.

## Key Informants

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Ken Middleton	Livestock/Large landowner
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Diana Steed	Skyline Forest Products
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Ken & Joyce	ERA Realty
York Jones	Livestock/Large landowner/Author
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## Appendices

### Appendix A: Available Landowner Assistance Programs

There are programs available to provide land owners with technical assistance and/or cost share projects, to better manage their land. There are also programs that assist with purchasing property easements. The following will give a brief description of each program summarized below:

#### **Management Assistance and Funding Programs**

1. Forest Stewardship Program
2. Forest Land Enhancement Program (FLEP)
3. Forest Resource Management Program
4. Natural Resource Conservation Services (NRCS) Programs
5. Utah State University State Extension Service (Forestry Extension Program)
6. Utah Division of Wildlife Cooperative Wildlife Management Unit (CWMU) Program
7. National Fire Plan Programs

#### **Conservation Easement Programs**

1. Trust for Public Lands
2. Utah Public Land Trust
3. The Nature Conservancy (TNC)

#### **Other Contacts Not Detailed**

1. Western Excelsior- (970-533-7412), can give current market trends.
2. Jim Matson, Consultant (435-644-8841), Cell (435-689-0975) can work with local Stewardship Center in Cedar City to develop bid package for aspen projects.
3. Fishlake Lumber Company; Beaver, Utah (435-438-5454); Lynn Anderson.
4. K & D Forest Products; Panquitch, Utah (435-676-8194); Kevin Frandsen.
5. Skyline Forest Resources; Escalante, Utah (435-826-5422); Stephen Steed.

## **Forest Stewardship Program**

This is a federal cost share program to encourage forestry resource conservation. Funds are available for qualified land owners up to \$10, 000 per year.

The Forest Stewardship Program, established by the 1990 Farm Bill, authorizes the Forest Service, through the State Foresters and other private and public sector programs, to provide technical assistance to owners of non-industrial private forestland (NIPF) not currently under management and to those who wish to increase their management activities. The information and assistance provided the landowner is intended to help them understand actions they might take to manage, enhance, and protect the productivity of timber, fish and wildlife habitat, water quality, wetlands, recreational value, and aesthetics.

Forest Stewardship Program focuses on providing technical assistance to landowners not currently managing their forestland according to a Forest Stewardship Plan or multi-resource management plan. Landowners with existing management plans may be eligible for the program if they agree to comply with the requirements of the program, or if they expand their management activities to meet the requirements of the Forest Stewardship Program. The program is administered through the State Forester.

Available practices under Forest Stewardship Program are tree planting, improving a stand of forest trees, and site preparation for natural regeneration.

To qualify, the first step is to develop a land management plan through the Division of Forestry, Fire, and State Lands or a private consultant. This program will cover up to 65% of the cost of implementing a project after it has been reviewed and accepted by the State Forester.

### **Eligibility:**

1. Own no more than 1,000 acres of eligible forest land.
2. Be a private land owner of a non-industrial forest.
3. Have land that is suitable for conversion from non-forest into forestland.
4. Have land that is capable of producing marketable timber and meets minimum productivity standards.

For program information, contact:

Clint Reese, State Area Forester, Cedar City (586-4408)

WebSite: <http://www.fs.fed.us/r1-r4/spf/stewardship.html>

## **Forest Land Enhancement Program (FLEP)**

The Forest Land Enhancement Program established by the 2002 Farm Bill authorizes the federal government to provide up to 75% of the funds necessary for non-industrial private forest (NIPF) landowners to implement practices identified in certified Forest Stewardship Management Plans to implement forestry practices contained in their plans. FLEP is a key component of the practice to establish, restore, protect, manage, maintain, and enhance the health and productivity of the non-industrial private forest lands in the United States for timber, habitat for flora and fauna, soil, water, and air quality, wetlands, and riparian buffers.

Activities include tree planting, reforestation, thinnings, soil and water improvement, riparian protection and enhancement, windbreak establishment and renovation, wildlife habitat enhancement, etc.

### **Eligibility:**

Qualifying NIPF land includes rural lands with existing tree cover or suitable for growing trees and owned by a private individual, group, association, or other legal private entity.

For program information, contact:

Clint Reese, State Area Forester, Cedar City (586-4408)

Web site: <http://www.fs.fed.us/r1-r4/spf/flep.html>



## **Forest Resource Management Program**

The Forest Resource Management Program provides technical assistance to non-industrial private forest (NIPF) land owners for improving management of their natural resources. It complements the Forest Stewardship Program and provides more specific services to landowners, including sample timber marking and non-cost/share thinning selection, sample timber sale contracts, insect and disease identification and management, wildlife habitat improvement, and referrals to consultants for more intense management assistance.

### **Eligibility:**

Must be a non-industrial private forest landowner.

For program information, contact:

Clint Reese, State Area Forester, Cedar City (586-4408)

Web site: [http://www.fs.fed.us/r1-r4/spf/resource\\_manage.html](http://www.fs.fed.us/r1-r4/spf/resource_manage.html)

### **Other Related Forestry Program Contacts:**

Utah State University State Extension Service (Forestry Extension Program)

Chad Reid, Ag agent (586-4408)

Website: <http://extension.usu.edu/forestry>

## **Utah Division of Forestry, Fires and State Lands Forest Legacy Program**

### **The Program**

The Utah Forest Legacy Program is designed to protect and manage, for future generations, environmentally important forest areas that are threatened by conversion to non-forest uses. Conservation easements are used to achieve this goal with priority given to lands which are threatened by future conversion to non-forest uses, maintain forest sustainability, protect and enhance water quality and water supplies, protect wildlife habitat and maintain habitat connectivity for biodiversity, maintain and restore riparian areas, and assist in maintaining the cultural and economic vitality of rural communities. Once key areas and properties are subdivided, fragmented and converted to developed uses, the critical natural resource values are often lost forever. The program has been operating in Utah since 1999.

### **Private Landowner Forests**

The role of private forest lands in helping produce a sustainable flow of goods and services dramatically exceeds that of Federal lands. Across America, 67% of the forests are non-Federal. The wise use of these lands is critical to the health and quality of human life, for us and future generations. Successful conservation and the continuing goods and services flow from natural resources depend on encouraging sound forest stewardship by private landowners.

### **Conservation Easements**

One method of assistance to landowners is to purchase conservation easements on a “willing seller” basis. Instead of making costly outright purchase of forest land, conservation easements limit development rights. This insures that the land will remain in forest cover while private landowners continue to own, manage and use their lands and natural resources.

### **Owner's Management Plan**

Accompanying the conservation easement is a Management Plan or Forest Stewardship Plan (FSP) that is drawn up for each specific property. The FSP is written to encourage long-term stewardship by assisting private landowners with the active management of their forest and related resources. It is intended to be an action oriented, working document. The Plan is amended periodically to schedule a new phase of management practices, account for changes in landowner objectives, land ownership, market conditions, or other factors which may not have been present or apparent originally.

## Public Values

Conservation easements provide a tool to protect the basic values associated with desirable quality of life for the citizens of Utah. The protection of forest land, watershed, wildlife, air quality and scenic beauty provides benefits to each of us, even though public access is not always involved.

## Partnerships

Partnerships with The Trust for Public Land has assisted with the expertise to move forward. Funding support from the Governor's Quality Growth Commission has supplemented U.S.D.A. Forest Service funding. The agencies have also developed partnerships with The Nature Conservancy, Utah Open Lands, and The Rocky Mountain Elk Foundation. The cooperation and common interests of these public-private partnerships have been instrumental in program success.

## Eligibility:

Private forest landowners

For program information, contact:

Clint Reese, State Area Forester, Cedar City (586-4408)

Web site: <http://www.ffsl.utah.gov/legacy.php#OwnersMgmtPlan>

## **Natural Resources Conservation Service (NRCS) Programs**

### **1. Conservation Technical Assistance**

The Conservation Technical Assistance (CTA) Program provides technical assistance supported by science-based technology and tools to help people conserve, maintain, and improve their natural resources. The CTA Program provides the technical capability, including direct conservation planning, design, and implementation assistance, that helps people plan and apply conservation on the land. This assistance is provided to individuals, groups, and communities who make natural resource management decisions on private, tribal, and other non-federal lands. NRCS, through the CTA Program, provides conservation technical assistance that addresses natural resource conservation issues at the local level that are of State and national concern.

Objectives of the program are to:

Provide conservation technical assistance to individuals or groups of decision makers, communities, conservation districts, units of State and local government, tribes, and others to voluntarily conserve, maintain, and improve natural resources.

Provide community, watershed, and area-wide technical assistance in collaboration with units of government, to develop and implement resource management plans that conserve, maintain and improve natural resources.

Provide conservation technical assistance to agricultural producers to comply with the Highly Erodible Land (HEL) and Wetland (Swampbuster) Conservation Compliance Provisions of the 1985 Food Security Act, as amended.

Provide conservation technical assistance to decision makers to assist them to comply with Federal, State, tribal, and local environmental regulations and related requirements, and to prepare them to become eligible to participate in other Federal, State, and local conservation programs.

Provide soils information and interpretation to individuals or groups of decision makers, communities, States, and others to aid sound decision making in the wise use and management of soil resources.

Collect, analyze, interpret, display, and disseminate information about the status, condition, and trend of soil, water, and related natural resources so that people can make informed decisions for natural resource use and management.

Assess the effects of conservation practices and systems on the condition of natural resources.

Develop, adapt, and transfer effective science-based technologies and tools for assessment, management, and conservation of natural resources.

Purpose of the Program is to:

The CTA Program provides the proven and consistent conservation technology and delivery infrastructure needed to achieve the benefits of a healthy and productive landscape, and has the following purposes: reduce soil loss from erosion, solve soil, water quality, water conservation, air quality, and agricultural waste management problems, reduce potential damage caused by excess water and sedimentation or drought, enhance the quality of fish and wildlife habitat, improve the long term sustainability of all lands, including cropland, forestland, grazing lands, coastal lands, and developed and/or developing lands, and assist others in facilitating changes in land use as needed for natural resource protection and sustainability.

#### Relation to Other Conservation Provisions and Programs

The CTA Program provides the local delivery system and the foundation technical expertise for other NRCS programs. The CTA Program is unique because it provides a substantive level of technical expertise, background and support for Federal, tribal, State, and local conservation programs. This technical base enables other NRCS programs by facilitating conservation planning, interagency coordination, technical consultations, and collaboration with decision makers. For example, the CTA Program assists in preparing landowners and decision makers for participation in USDA conservation financial assistance and easement programs. The CTA Program also provides much of the preliminary emergency disaster technical assistance for the Agency's Emergency Watershed Protection Program. The CTA Program also is available to assist clients with maintenance of conservation plans and practices/systems that resulted through expired or completed financially-assisted contracts or projects. The CTA Program also is used to assist decision makers for conservation planning prior to the commitment or approval of a participant's funding for financial assistance.

#### 2. Conservation of Private Grazing Land

The Conservation of Private Grazing Land (CPGL) initiative will ensure that technical, educational, and related assistance is provided to those who own private grazing lands. It is not a cost share program. This technical assistance will offer opportunities for: better grazing land management; protecting soil from erosive wind and water; using more energy-efficient ways to produce food and fiber; conserving water; providing habitat for wildlife; sustaining forage and grazing plants; using plants to sequester greenhouse gases and increase soil organic matter; and using grazing lands as a source of biomass energy and raw materials for industrial products.

Conservation of Private Grazing Land Program was authorized by the conservation provisions of the Federal Agricultural Improvement and Reform Act (1996 Farm Bill). The intent of this provision is to provide accelerated technical assistance to owners and managers of grazing land. The purpose is to provide a coordinated technical program to conserve and enhance grazing land resources and provide related benefits to all citizens of the United States. Currently, funds have not been appropriated for this program.

### 3. Conservation Partnership Initiative

The Conservation Partnership Initiative (CPI) is a voluntary program established to foster conservation partnerships that focus technical and financial resources on conservation priorities in watersheds and air sheds of special significance. Under CPI, funds are awarded to State and local governments and agencies; Indian tribes; and non-governmental organizations that have a history of working with agricultural producers. The CPI is a component of the Conservation Technical Assistance (CTA) program, established under authorities provided by the Soil Conservation and Domestic Allotment Act of 1935, 16 U.S.C. 590a *et seq.* NRCS administers CPI.

### 4. Grazing Lands Conservation Initiative (GLCI)

The Grazing Lands Conservation Initiative is a nationwide collaborative process of individuals and organizations working together to maintain and improve the management, productivity, and health of the Nation's privately owned grazing land. GLCI was developed to provide for a coordinated effort to identify priority issues, find solutions, and effect change on private grazing land. This initiative will complement and enhance existing conservation programs.

There is a National GLCI Steering Committee and many state committees throughout the country. Coalitions represent the grass root concerns that impact private grazing land. Concerns are expressed to the public and agency officials in an attempt to address the issues impacting private grazing land.

GLCI seeks to strengthen partnerships, promote voluntary assistance and participation, respects private property rights, encourages diversification to achieve multiple benefits, and emphasizes training, education, and increased public awareness. Private grazing landowners are eager to voluntarily improve their lands. However, they need technical assistance to help them use the latest and best technology to make grazing land management decisions. Existing technical assistance is limited for those who own grazing land and does not meet the needs for adequately sustaining or enhancing the resources.

Through GLCI efforts, Congress has identified funds in the Natural Resources Conservation Services' budget to be used directly for technical assistance and public awareness activities to support conservation activities on private grazing lands. The Natural Resources Conservation Service is one of the primary players in the initiative. The Natural Resources Conservation Service (NRCS) is the technical agency of the US Department of Agriculture that provides assistance to conservation districts and individuals in planning and carrying out conservation activities.

NRCS has the expertise and experience to provide technical assistance to owners and managers of private grazing land for the long-term productivity and ecological health of grazing land. NRCS assists with public awareness activities to inform the public on the values and benefits of private grazing land.

Coalitions are made up of individuals and organizations that work collectively to accomplish the goals and objectives of the initiative. When opportunities exist, coalitions can be expanded to include individuals and organizations that have an interest in private grazing lands to help achieve the objectives of the initiative. Generally, personnel from government agencies and universities serve in an advisory capacity to the coalitions. Coalitions actively seek sources to increase technical assistance and public awareness activities that maintain or enhance grazing land resources. State and local coalitions support national strategies and also develop local strategies and goals to meet their local needs.

For program information, contact:

Tom Simper, Range Management Specialist, 586-2429 ext.17

Website: <http://www.nrcs.usda.gov/programs>

## **Utah Division of Wildlife Resources Cooperative Wildlife Management Unit (CWMU) Program**

Cooperative Wildlife Management units are established to increase wildlife resources; provide income to landowners; provide the general public access to private and public lands for hunting big game or turkey within a Cooperative Wildlife Management Unit; create satisfying hunting opportunities; and provide adequate protection to landowners who open their lands for hunting.

### **Eligibility:**

The minimum allowable acreage for a CWMU is 10,000 contiguous acres, although there are exceptions for smaller acreages (5000 ac). Landowners must develop a CWMU Management Plan consistent with statewide and unit management objectives for the respective big game or turkey management unit and approved by the Wildlife Board. The CWMU Management Plan may be approved by the Wildlife Board for a period of five years.

### **Contact Information:**

Information manager: Lynn Chamberlain, [LynnChamberlain@utah.gov](mailto:LynnChamberlain@utah.gov)

Division of Wildlife Resources

Building address: 1470 North Airport Road, Cedar City, UT 84720

Mailing address: P.O. Box 606, Cedar City, UT 84721-0606

Phone: (435) 865-6100

Website: [http://www.wildlife.utah.gov/proclamations/2004\\_biggame/xxviii.html](http://www.wildlife.utah.gov/proclamations/2004_biggame/xxviii.html)



## **National Fire Plan Programs**

The National Fire Plan (NFP) was developed in August 2000, following a landmark wildland fire season, with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. The NFP addresses five key points: 1) firefighting, 2) rehabilitation, 3) hazardous fuels reduction, 4) community assistance, and 5) accountability.

### **Hazardous Fuels Treatment (HFT) Grants**

Fire assistance funds targeted at Hazardous Fuels Treatment on non-federal lands adjacent to active Forest Service and/or Bureau of Land Management Hazardous Fuels Treatment projects to mitigate risks of hazardous fuels conditions on non-federal lands in the Wildland Urban Interface adjacent to active Forest Service and/or Bureau of Land Management Hazardous Fuels Treatment projects; focus of this program is hazardous fuels treatment on non-federal lands

#### **Website:**

<http://www.fireplan.gov/>

Forestry, Fire, and State Lands  
585 North Main,  
Cedar City, Utah  
84720-2643  
(435) 586-4408

## **Trust for Public Lands – Utah Programs**

### **1. Agricultural Lands Protection**

In partnership with land owners, elected leadership and local land trusts, the Utah Quality Growth commission, the state Division of Wildlife Natural Resources, and community organizations, TPL is working to protect thousands of acres of Utah pioneer heritage farmlands in historic Cache, Rich and Weber counties. Among these lands are portions of the Elkhorn Ranch, Cache Valley's first Mormon pioneer ranch, the site of the first creamery in Cache Valley, and thousands of acres of wildlife habitat for local and migratory waterfowl, songbirds and other species. Through fundraising from federal, state and private sources, TPL and its partners will purchase conservation easements on these lands, preserving them as they currently exist and leaving them in private ownership. With preservation of several notable properties in Cache, Rich and Weber counties as a first phase, TPL envisions the protection of farm and ranchlands throughout the state, preserving Utah's natural heritage, traditional working lands, and sites of historic significance.

### **2. Forest Legacy**

During the past three years, TPL has secured funding to protect almost 30,000 acres of Utah forest. Federal Forest Legacy grants provide funding to protect and manage environmentally and recreationally important, privately-held forest lands threatened with conversion to other development uses. When land owners wish to preserve their lands as forest, TPL has purchased the property's development rights and created a conservation easement that is held and monitored by the State of Utah in perpetuity. Forest Legacy conservation easements enable land owners to continue to own, control access, manage and use their lands, within terms outlined in the easement. TPL has worked with land owners throughout the state to preserve properties including the 7,300-acre Peaceful Valley Ranch in East Canyon near Salt Lake City, the 8,900-acre Chalk Creek Ranch in Morgan County, and, most recently, the 4,200-acre Wilcox Ranch in the Book Cliffs region of central Utah.

### **3. Farm and Ranch Lands Protection Program**

First established in 1996, the Farm and Ranch Land Protection Program (FRPP) provides matching grants to states, local, tribal and non-profit entities for the purchase of agricultural conservation easements. The program is administered by the USDA Natural Resources Conservation Service (NRCS).

The program was reauthorized at significantly increased levels in the 2002 Farm Bill (link: P.L. 107-171). Beginning with an authorization of \$50 million in 2002, funding levels increased to \$100 million in 2003, \$125 million in both 2004 and 2005, \$100 million in 2006, and \$97 million in 2007. As of the end of fiscal year 2003, more than 300,000 acres of farm and ranch land have been protected in 42 states.

Funding is provided through a grant to the applicant that must be matched with a 50 per cent share of non-NRCS funds. In addition, up to 25% of the easement's value can be donated by the landowner and counted as match. Grant applications are submitted by a state or local entity, or eligible non-profit, to the State Conservationist, a federal employee who oversees all programs in that state. The state conservationist then prioritizes the projects and sends them to NRCS in Washington for funding. Demand for project funding far exceeds available amounts, so the program is extremely competitive.

Existing FRPP program criteria require that eligible FRPP projects must be threatened by development and located near agricultural infrastructure and markets. Ranking criteria include agricultural significance and relative size of the property, as well as other factors described in the program's rules. Applicants must demonstrate a commitment to farmland protection through the use of farmland protection techniques and by establishing a capacity to monitor and enforce conservation easements. Farm conservation plans must be implemented on all FRPP projects, and there must be a pending offer from the landowner.

Once funds are made available to the NRCS for the FRPP, the agency sets each state's funding apportionment and then issues a Request for Proposals (RFP) in the Federal Register that sets out the program rules and deadline for grant submissions. Because FRPP projects are submitted by a state or local entity or non-profit through the local NRCS office, and require a 50 percent match, applicants should work closely with those individuals regarding submission of an application for funding.

For more information, please reference the [Farm and Ranch Lands Protection Program](#) on the U.S. Department of Agriculture site.

Program Contact:

Aline Bokde (801/870-4335)

Website: [http://www.tpl.org/tier3\\_cd.cfm?content\\_item\\_id=13423&folder\\_id=675](http://www.tpl.org/tier3_cd.cfm?content_item_id=13423&folder_id=675)

## **The Nature Conservancy**

### **Conservation Easements Keep Land in Private Hands, Preserve Traditional Land Uses and Protect Land for Future Generations**

Easements protect land for future generations while allowing landowners to retain many private property rights and to live on and use their land as they have traditionally. At the same time, easements offer landowners potential tax benefits if donated, or revenue from the sale of an easement.

Benefits of conservation easements for landowners:

- Land remains privately owned; ownership rights stay in place
- Landowners can live on the land
- Agricultural traditions and land uses maintained
- Land protected from subdivision
- Tax benefits help keep land intact and in the family
- Land protected beyond their lifetimes
- Landowners can fulfill their vision for the future of their land and waters
- Options for children and grandchildren to farm and ranch preserved
- Ecological and scenic values preserved
- Tax savings and sales proceeds can boost agricultural operations
- Easement agreement remains with the property, even if the land is sold
- Easement terms individually tailored to meet landowners' needs

Website:

<http://nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/>

#### **Utah Field Office**

559 E. South Temple  
Salt Lake City, UT 84102  
(801) 531-0999

## **Other Contacts Not Detailed**

Aspen has experienced numerous uses for many years. Some of the earliest buildings on Cedar Mountain utilized aspen logs for their construction. One of the more traditional uses of aspen has been for the construction of pole fences on Cedar Mountain. There may be some use of aspen for firewood; however, the use is mainly by landowners themselves and there is no market value due to the saturation of the fuelwood market. Excelsior from aspen was produced locally until the plant closed in the late 1980's. The closest producer of excelsior currently is in Mancos, Colorado, which is about 250 miles to the east.

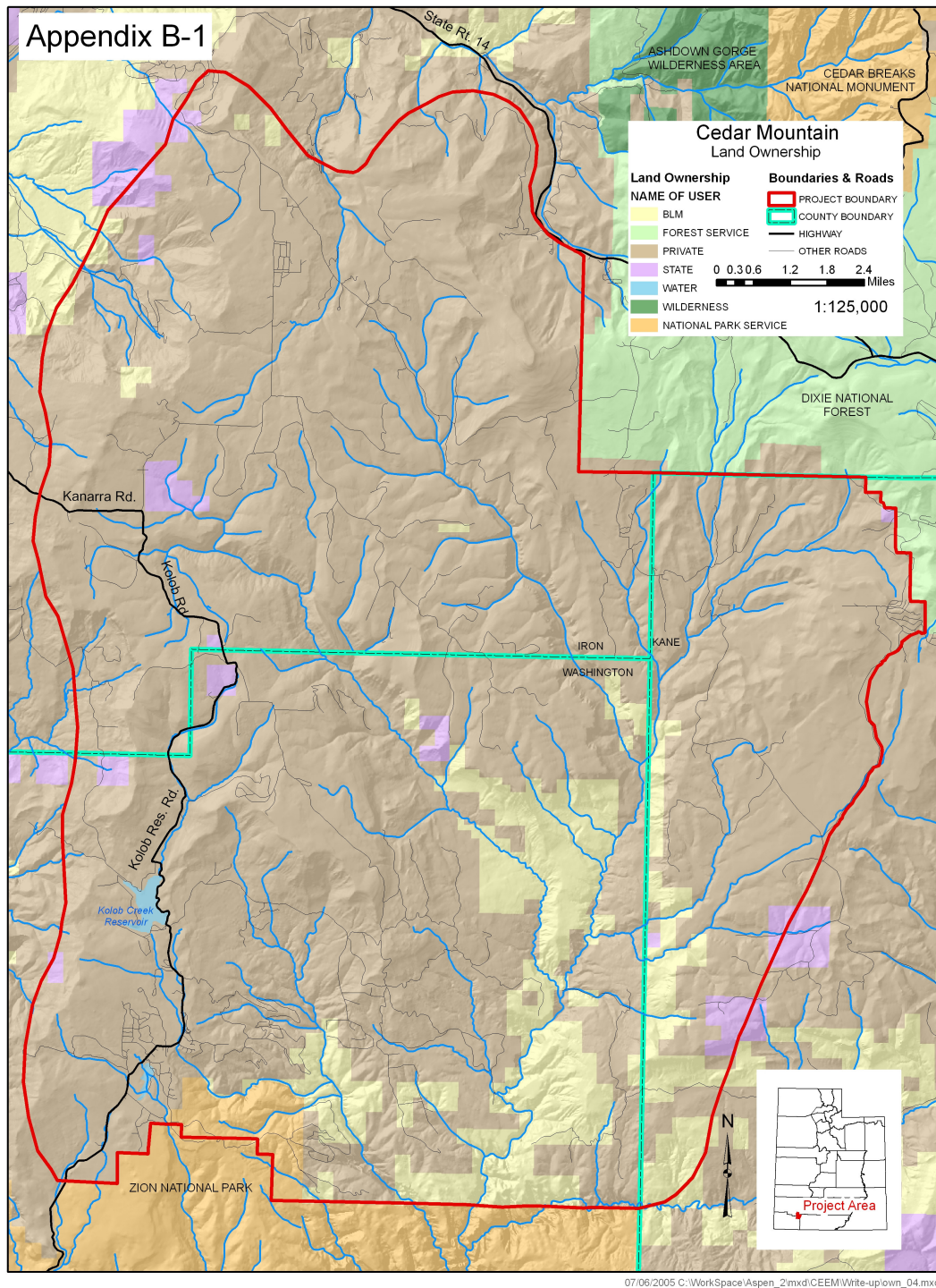
Three mills, which are in fairly close proximity to Cedar Mountain, do process aspen; however, only two of the mills are interested in acquiring more volume. One sawmill indicated that an emerging market might involve the use of shredded aspen bark for landscaping purposes. Another sawmill indicated that they bag aspen shavings to be used for animal bedding material. All of the sawmills do produce boards out of the best quality material that is later milled into tongue and groove paneling while the poorer quality material goes into pallet stock.

Fishlake Lumber Company, located in Beaver, Utah, which is about 55 miles from Cedar City, is interested in acquiring very small quantities of aspen, at the time of this report. K & D Forest Products of Panguitch, Utah, which is approximately 70 miles from Cedar City, currently has an adequate supply of aspen; however, their need could change in the future. Skyline Forest Resources, located in Escalante, Utah, which is about 120 miles from Cedar City, indicated that over the last couple of years the majority of their timber has come off of private land. One landowner on Cedar Mountain, who is in the third year of some aspen treatments, hired a logger to harvest and haul their aspen to Skyline in Escalante.

It was suggested that interested landowners might be able to form a cooperative to harvest aspen as a group. By banding together, a steady supply of aspen could be created that may encourage mills to increase their milling capacity. No processing facilities are close to the Cedar Mountain area that can handle significant increases in the available volume of aspen.

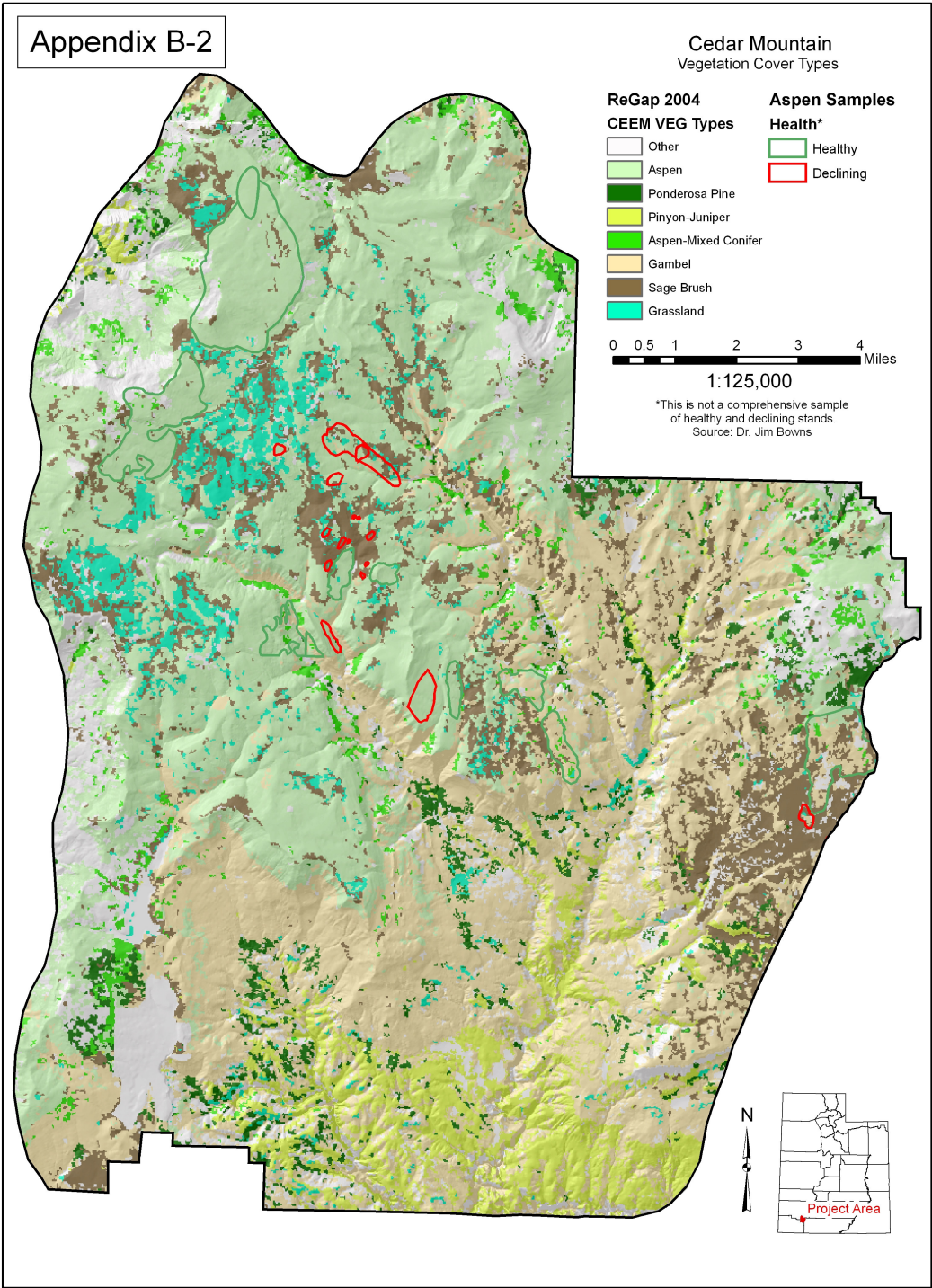
## Appendix B: Maps

### Appendix B-1: Land Ownership

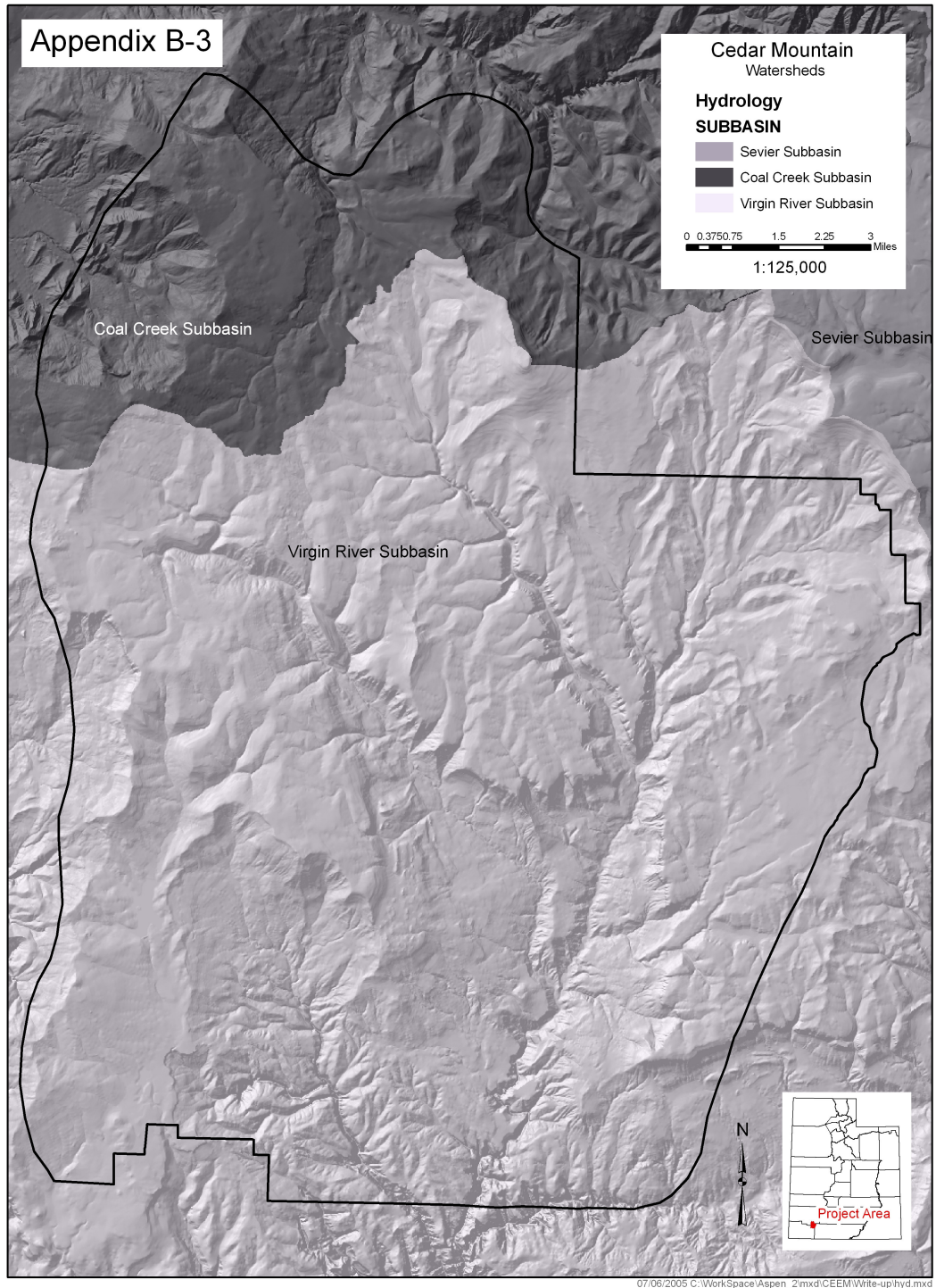




Appendix B-2: Vegetation Cover Types



## Appendix B-3: Watersheds





## Appendix C: Cedar Mountain Initiative

### **Background**

In 1999, the Utah Legislature charged the Agricultural Experiment Station to investigate livestock/wildlife interactions and aspen regeneration on mountain rangelands. Specifically, this work will determine how these rangelands should be managed using livestock and big game populations to optimize benefits for individual ranchers, local communities, sportsmen, and other Utah residents.

### **Purpose of the Cedar Mountain Initiative Citizen Liaison Committee (CMI-CLC)**

The purpose of the Cedar Mountain Initiative Citizen Liaison Committee is to enhance communication between the researchers and extension specialists conducting this work and the citizens of Utah who are the beneficiaries. This committee consisting of both the public and private sector representatives, will meet annually on the Cedar Mountain Research site to review research and extension work being conducted under the Initiative. Committee members will provide guidance and serve as an important communication conduit for keeping constituents informed about the work and providing feedback to the researchers and extension specialists regarding the issues that are important to the citizens of Utah. Dr. Jim Bowns of SUU will chair this committee.

Following are reports of activities over the last five years , or proposed for future work.

## **LANDOWNERS' ADOPTION OF LIVESTOCK AND RANGE MANAGEMENT INNOVATIONS**

### **Investigators:**

Mark Brunson, USU Dept. of Environment & Society  
Elizabeth Didier, USU Dept. of Rangeland Resources (now Univ.  
of Arizona Extension)

### **Objectives:**

1. To identify topics that southwest Utah livestock producers would find most useful
2. To assess attitudes of fee-hunting “target market” toward livestock grazing on their hunting grounds
3. To identify characteristics of innovators and “early adopters” of innovations in the Utah ranching community.
4. To identify factors that impede or facilitate innovation adoption among Utah ranchers.

### **Methodology:**

1. Interviews were conducted among Utah livestock producers identified as “opinion leaders” by others in the industry or by state/federal officials involved in ranching.
2. Surveys were completed by 155 hunters who held permits for the Paunsaugunt hunting unit, a limited-entry area that attracts the kind of hunters targeted by ranches that operate cooperative wildlife management units (CWMU's).
3. Interviews with “key informants” (BLM, NRCS and Extension personnel) were conducted to identify innovative producers and obtain impressions of innovation in the Utah ranching community generally. This yielded a list of 34 ranchers statewide who were identified as innovators. Of these, 44% took part in 31-question (60-90 minute) interviews about their operations, their perspectives on ranching in Utah and change in livestock production generally, factors involved in innovation decisions, and barriers to implementation of changes.

### **Results:**

Initial producer interviews found a high level of awareness of Cedar Mountain studies. Topics of interest to producers included: forage competition with deer/elk, gophers; economic improvements (livestock, aspen, deer); predator control; poisonous plants; livestock diseases (especially in sheep); and improvements in native forage production.

Hunter surveys found that 38% felt sharing the land with livestock detracted from a hunting experience, and respondents tended to attribute resource damage to cattle rather than other potential sources (e.g., hikers, wildlife, motorized users).

Many would seek a hunting experience where OHVs were not allowed – something ranchers could provide.

Key informant interviews found that most interviewees believe innovation is very rare in Utah ranching. Management changes identified included: brush control, water developments, management-intensive grazing, and CWMU participation. Barriers to change included: tradition, pessimism about the future of ranching, need to earn off-ranch income, Utah's settlement pattern, and liability concerns.

Interviews of innovators found the following common characteristics: innovators tend to be dependent on ranching for their income, work full-time on the ranch, live on the ranch rather than in town, work a ranch that has served multiple generations of family and expect this to continue through the next generation, have larger-than-average social networks, but do not see themselves as “risk-takers.” They make changes to improve profits, improve stewardship, and demonstrate that stewardship to agency personnel and the public. Barriers to adoption include: access to labor, access to capital, attachment to tradition, uncertainty about the future, liability (for fee hunting), changes in public laws, perceptions of a saturated fee-hunting market, and design of government programs such as EQIP.

**Products:**

1. M.S. thesis at USU for Elizabeth Didier (2002).
2. Presentations at meetings of the Society for Range Management, International Association for Society & Resource Management, BLM National Training Center.
3. Publication in the Journal of Range Management: Didier, E.A., and M.W. Brunson. 2004. Adoption of range management innovations by Utah ranchers. Journal of Range Management 57:330-336.
4. Creation of an annotated bibliography of research on innovation adoption in livestock production and in the Intermountain West (not yet published).

**Other Funding Partners:**

Utah State University, Bureau of Land Management

## **RESTORATION OF ASPEN IN DIFFERENT STAGES OF MORTALITY IN SOUTHERN UTAH**

### **Investigators:**

Seth Ohms (SUU and Dept. of Forest, Range, and Wildlife Sciences - USU)

Dale L. Bartos (USDA-Forest Service and FRWS Dept. – USU)

### **Objectives:**

(1) Determine if decadent, non-regenerating mature aspen stands could be regenerated through clearcutting; (2) determine the extent of ungulate use of regenerating aspen ramets; and (3) develop management recommendations for landowners and land managers.

### **Methodology:**

Clearcuts were made in late summer of 2001 in 10 different clones that exhibited various levels of decline on a continuum from relatively healthy to extremely deteriorated. Nested wildlife/livestock exclosures were constructed in each clearcut plot, as well as in a corresponding uncut control plot. In the fall of 2002, regenerating suckers were counted. In addition, vigor and ungulate utilization of these suckers were measured in the wildlife and livestock exclosures, as well as in an unprotected portion of the clearcut and control plots.

### **Results:**

Regeneration of the clearcut plots ranged from none in the most decadent clones, to 75,000 stems/ha in the least decadent clone, and was significantly greater than the control plots. Greenhouse trials found no difference in regenerative abilities between clones, however regeneration success in the clearcut plots was significantly related clone basal area prior to treatment. Vigor, as measured by height of the suckers, was 1.5 to 2.1 times greater in the clearcut plots than in the control plots. Seventy-three percent of the suckers in the unprotected portion of the plots were heavily browsed, while only 12% were not browsed. As a result of severe decadence and browsing pressures, which may limit the clone's ability to successfully restock and remain on the landscape, management recommendations for Cedar Mountain aspen clones were successfully developed utilizing regenerative status, basal area, and browsing pressure.

### **Products:**

- (1) Ohms, Seth Ray. 2003. Restoration of Aspen in Different Stages of Mortality in Southern Utah. M.S. Thesis, Utah State University, Logan, UT. 99 pp.
- (2) Ohms, S. R. and D. L. Bartos. 2004. *In review*. Browsing of aspen regeneration in a Utah aspen-dominated community. Rangeland Ecology and Management (Formerly the Journal of Range Management). Lakewood, CO.
- (3) Ohms, S. R. and D. L. Bartos. 2004. *In prep*. Clone basal area as a determinant of sucker production in a Utah aspen-dominated community. Western Journal of Applied Forestry. Bethesda, MD

- (4) Results presented at:
- Utah Society for Range Management (SRM) 2002
  - International SRM meeting 2003
  - Utah Wildlife Society 2003
  - Utah Woolgrowers 2002
  - Western Aspen Symposium 2004
  - Multiple fieldtrips with local landowners and managers 2002-2004.
- (5) Video "Fading Gold—the decline of aspen in the west" Partial funding by UDWR, Fishlake N.F., R-4, RMEF, RMRS. This 15 minute video details the plight of aspen as it occurs in the west. This description is relevant to the Cedar Mountain Region of Southern Utah.

**Additional Research Questions:**

The role of insects and diseases related to the present aspen decline on Cedar Mountain was addressed but did not appear to be the primary factor leading to the decline.

**Other Funding Partners:**

Utah State University, U.S. Forest Service.

## **LOSS OF LIVESTOCK FORAGE AS CONIFERS REPLACE HISTORIC ASPEN STANDS**

### **Investigators:**

Barton Stam (Assist.Exten. Educator, Univ. Wyoming Coop. Exten. Serv., Termopolis)  
John Malechek (Professor Forest, Range and Wildlife Dept., Utah State Univ., Logan)  
Dale Bartos (USDA Forest Service and Forest, Range, and Wildlife Dept., USU, Logan)  
James Bowns (Professor, Dept. Biology, Southern Utah Univ., Cedar City)  
Bruce Godfrey (Professor, Dept. Economics, Utah State Univ., Logan)

### **Objective:**

Determine the extent and estimated economic value of livestock forage that has been forgone due to aspen replacement by coniferous tree species on the Dixie and Fishlake National Forests and on private rangeland on Cedar Mountain.

### **Methodology:**

We measured the biomass of forage plants in the understories of aspen stands, stands of mixed aspen-conifer and stands that were historically aspen but are now dominated by conifers. This was done on both high-potential and low-potential sites on the Dixie and Fishlake National Forests and on private rangeland on Cedar Mountain during summers of 2002 and 2003. A statistical relationship was then established between forage production and conifer overstory. The economic value of forgone forage was estimated by translating animal unit months (AUMs) of forage into potential weight gain by feeder calves grazing on similar rangeland, and then applying 2003 market values to the amount of calf weight gain that would have been realized if ranges now dominated or partly-dominated by conifers had remained as historic aspen stands.

### **Results:**

There was a close statistical negative relationship between understory forage production and conifer overstory. The relationship was curvilinear with the greatest decline occurring over the range of conifer cover between 0% and 15%. At conifer cover levels exceeding around 15%, understory biomass production is severely reduced. When these potential AUMs of forage were translated into livestock weight gains valued at 2003 market prices, forgone gross revenues ranged from \$10.1 to \$14.4 million for the combined Dixie and Fishlake National Forests. Additional forgone revenues to the U.S. Treasury might be associated with unrealized grazing fees.

### **Products:**

- (1) M.S. thesis at USU (Barton Stam, 2004)
- (2) Presentation at 57<sup>th</sup> Annual Meeting of Society for Range Management, Jan. 2004, Salt Lake City

(3) Manuscript ready to submit to the Journal of Rangeland Ecology and Management in Nov., 2004.

**Other Funding Partners:**

Utah Agricultural Experiment Station; US Forest Service (in-kind contribution of time by Mr. Steve Smith, Range Mgt. Specialist, Dixie Natl. Forest, and access to research sites on Dixie and Fishlake Forests)

## **BREEDING BIRD DIVERSITY ON PRIVATE RANGELANDS IN UTAH**

### **Investigators:**

Todd Black, USU Community-based Conservation Specialist  
Terry A. Messmer, Extension Wildlife Specialist

### **Objectives:**

The purpose of this study is to monitor bird population trends on privately owned properties throughout Utah (Figure 1). Upon completion of this study, the data will be compared with UDWR databases to assist wildlife managers with improved estimates of trends, abundance, diversity, and overall statewide population database on birds. It also will provide information as to the role private land serves in conserving songbird populations. Project objectives are:

- (1) To establish breeding bird census routes and database for selected private rangelands in Utah.
- (2) To compare breeding bird diversity by land ownership and land use
- (3) To assist Utah private landowners in developing bird species lists that could be used to develop ranch “watchable wildlife” programs and promote ranch recreation

### **Methodology:**

Breeding bird surveys were conducted between 1999-2003 on Cedar Mountain and other Private rangelands located throughout. The surveys used techniques followed employed by the Utah Division of Wildlife Resources and national bird monitoring program.

Six tracts of private land were initially selected for this project. These included; (1) Alton CWMU in Kane County, (2) Ensign CWMU in Morgan/Weber County, (3) Oak Ranch CWMU in Sevier County, (4) Promontory Point CWMU in Box Elder County, (5) Redd Ranches CWMU in San Juan and Grand Counties, and (6) and the Cedar Mountain area located in Iron County. In 2001, four of the original six CWMUs (Ensign, Promontory Point, Redd Ranches, and Oak Ranch) were dropped from the study so that additional areas/ranches could be surveyed and data added to the database. Each of these landowners was provided a bird species list for use in developing a bird watching/nature tourism enterprise.

In 2000, the Lower Logan River in Cache County was added to the study and in 2001, four additional CWMUs were added to the study. These included; (1) Park Valley Hereford CWMU in Box Elder County, (2) Mt. Carmel CWMU in Kane County, (3) Hardscrabble CWMU in Salt Lake and Davis County, and (4) Johnson Mountain Ranch CWMU in Sevier.

These units were selected on one or more of the following criteria: (1) landowner interest in the project, (2) diverse topography, vegetation types, and habitat, (3) geographical location within the state, (4) previous work conducted in these areas, and (5) investigators prior knowledge of the area.



BBS route(s) were conducted on Cedar Mountain and Alton CWMU on the 1<sup>st</sup> and 26<sup>th</sup> of June respectively. Survey dates for the PIF counts were conducted at similar dates and times as previous surveys (1999/2000). When possible the landowner or an employee of the landowner accompanied the technician while conducting the survey. This was done to involve the landowner in the project in hopes of having the landowner to continue the surveys once the pilot project is complete. The BBS and PIF data were entered into a Microsoft Excel Spreadsheet for subsequent analysis in future years.

Ten PIF point count stations were established on six of the seven ranches. These included: (1) Mt. Carmel CWMU, (2) Cedar Mountain, (3) Johnson Mountain Ranch CWMU, (4) Hardscrabble CWMU, (5) Park Valley Hereford CWMU, and Logan River. All of these stations were visited a total of three times between 12 May and 5 July 2001 and followed similar dates and times as the previous year (1999/2000).

Over 380 man-hours were logged during 2001 phase of this project. This included; pre-project implementation, fieldwork, data entry, and summary report.

#### **Results:**

A species list for all birds observed on each ranch surveyed has been provided to each landowner to be used for recreational purpose on the ranch. However, this list will also indicate whether or not the bird was observed on the PIF, BBS or through other non-established methods allowing investigators to determine the effectiveness of these surveys in determining overall species diversity of the ranch.

#### **Public Outreach, Presentations and Products:**

Annual reports distributed to participating landowners and partners.

#### **Future Activities:**

PIF point count stations will be established on additional ranches. This number has yet to be determined. These units will further the development of the database and the amount of data collected. Data collected at these stations were recorded on data sheets provided by the UDWR and later entered electronically into a Microsoft Access database as provided by UDWR. These data are currently being analyzed to compare breeding bird diversity by land ownership and land use.

#### **Partners:**

Jack H. Berryman Institute, Utah Division of Wildlife Resources (UDWR)  
Utah Cooperative Wildlife Management Association  
Alton CWMU  
Cedar Mountain  
Ensign CWMU  
Hardscrabble CWMU

Johnson Mountain Ranch CWMU  
Mt. Carmel CWMU  
Oak Ranch CWMU, Park Valley Hereford CWMU  
Promontory CWMU  
Redd Ranch CWMU  
PacifiCorp  
NRCS  
Utah Farm Bureau Federation  
Utah Department of Agriculture and Food  
Leupold and Stevens  
Brunton Optics  
Complete Wildlife Management Service

## **LIVESTOCK/WILDLIFE INTERACTIONS ON ASPEN RANGELANDS**

### **Investigators:**

Terry A. Messmer, USU Extension Service

Jessica Pettee, USU Extension Wildlife Associate and Graduate Research Assistant

Todd Black, USU Community-based Conservation Specialist

### **Objectives:**

- (4) To determine elk and mule deer habitat use patterns on aspen rangelands that are grazed by cattle and sheep under a deferred-rotation grazing regime
- (5) To determine if cattle and sheep grazing in aspen rangelands may benefit elk and mule deer.
- (6) To determine the impacts of early-season use of aspen rangelands by elk and mule deer impact forage availability for livestock.

### **Methodology:**

The study was conducted using 7 grazing replications consisting of 2 pastures each. Each pasture consisted of 200 acres. Four replications were grazed by cattle and 3 by domestic sheep using a deferred rotation grazing system. Livestock grazing was initiated in mid-June and the livestock removed in October. Mule deer-elk-livestock interaction data were collected from April to November in 2000 and 2001. To collect these data, 10 mule deer does and 10 cow elk were randomly captured on the study area and equipped with GPS. The GPS collars recorded animal location four times a day.

### **Results:**

Habitat use data were collected from 7 deer and 2 elk in summer 2000, and 5 deer and 5 elk in 2001. Hunter harvest of radio-collared elk and deer and collar battery failures impacted the sample size. Elk preferred pastures which had been grazed by livestock late the preceding summer. They avoided pastures currently being grazed by livestock. Deer that established seasonal home ranges on the pastures were somewhat oblivious to the presence of cattle. Deer avoided pastures currently being grazed by sheep, but preferred pastures sheep had grazed earlier in the season. Deer that had established home ranges encompassing pastures grazed by cattle shifted their use patterns to avoid the pastures occupied by the animals. Deer used denser cover when livestock were present on the study area. Deer home ranges were larger before and after livestock grazing than when livestock were present on the pastures. However once the cattle were removed from the pasture, the deer use patterns were again reflective of pre-livestock periods. Deer tended to prefer pastures that were grazed by sheep over those grazed by cattle. These results suggest that although deer and elk may be spatially intolerant to the presence of cattle, they preferred habitats that had been grazed by cattle and sheep over ungrazed rangelands.

### **Public Outreach and Presentations:**

- (1) Presentations at TWS, SRM, SCB, FB, NCBA, Ecological Society of America, and North American Wildlife and Natural Resource Conference in 2001-2002, and the Western Association of Fish and Wildlife Agencies (2001) to market the network.
- (2) Web-based news and information system on livestock/wildlife interactions (2000).
- (3) Articles in popular magazines and newspapers (2001-2002)

### **Future Activities and Needed Research**

Extreme drought, fire, and the loss of helicopter capture services severely impacted the 2003 field season. However, we were able to accomplish Objectives 1 and 2. Additional research will be needed to accomplish Objective 3. The role of livestock grazing in managing sagebrush steppe ecosystems has become a major policy issue because of the petitions that have been filed with the US Fish and Wildlife Service to list Sage-grouse and Pygmy Rabbits as endangered species. Research and demonstration projects are needed to document the role and relationship of livestock grazing sagebrush steppe ecosystems. This work would support the efforts of state-wide groups that are working to develop regional Sage-grouse management plans.

### **Partners:**

Cedar Mountain Initiative, S.J. and Jessie Quinney Foundation, College of Natural Resources Quinney Professorship for Wildlife Conflict Management, Jack H. Berryman Institute, The Wildlife Society, National Pork Council, Ducks Unlimited, National Fish and Wildlife Foundation, Utah State University Extension.

## **EFFECTS OF POCKET GOPHERS ON ASPEN REGENERATION AND HERBACEOUS VEGETATION IN UTAH**

### **Investigators:**

Stacey Trevor Coggins (Berryman Institute, Dept. of Forest, Range and Wildlife Sciences, USU)

Dr. Michael R. Conover (Berryman Institute, Dept. of Forest, Range and Wildlife Sciences, USU)

### **Objective:**

To determine the impact of pocket gophers on aspen regeneration and herbaceous vegetation.

### **Methodology:**

The effect of pocket gophers on aspen regeneration and herbaceous vegetation will be observed in a series of plots assigned to one of four treatments. These treatments include (1) a control group [no treatment], (2) baited treatment [pocket gopher removal], (3) fenced treatment [ungulate exclusion], and (4) a combined fenced and baited treatment [pocket gopher removal and ungulate exclusion]. The density, height, growth, and mortality of aspen suckers will be measured. Biomass of grasses and forbs and plant species diversity will also be determined.

### **Results:**

Fencing increased aspen sucker growth and height but not their density. Pocket gopher removal had no effect on aspen density, height or growth. Plant species diversity was not affected by any treatment. Fencing increased total herbaceous plant biomass, forb biomass, and grass biomass, but pocket gopher removal had no effect on these variables.

### **Products:**

- (1) Coggins, S. T. 2004. Effects of pocket gophers on aspen regeneration and herbaceous vegetation in Utah. M.S. Thesis. Utah State University, Logan.
- (2) Coggins, S. T., and M. R. Conover. 2005. Effects of pocket gophers on herbaceous vegetation. *Wildlife Society Bulletin*. In press.
- (3) Coggins, S. T., and M. R. Conover. 2005. Effect of pocket gophers on aspen regeneration. *Journal of Wildlife Management*. In press.

### **Other Funding Partners:**

Jack H. Berryman Institute, U.S. Forest Service

## **THE RESTORATION OF DEGRADED TALL FORB RANGELANDS OF THE INTERMOUNTAIN WEST**

### **Investigators:**

Seth Ohms (SUU and Dept. of Forest, Range, and Wildlife Sciences - USU)  
Dale L. Bartos (USDA-Forest Service and FRWS Dept. – USU)

### **Objectives:**

(1) Identify treatments that can “short circuit” or “jump start” the restoration process of Tall Forb rangelands so that management options can be implemented and carried to fruition on the order of a few years. (2) Delineate critical microenvironmental properties that may be manipulated by stakeholders to encourage tall forb establishment. (3) Develop methodologies for reintroduction, proper species mix, and the maintenance of the tall forbs once reestablished.

### **Methodology**

This study emphasizes the use of multiple study sites that possess both intact and degraded tall forb communities. The intact communities are being used as a baseline for indicators of system functionality. The effects of restoration efforts on degraded sites is being monitored and then compared to the intact communities. Soil properties are being most intensely monitored as soil condition appears to be the major influence dictating tall forb reestablishment. Tall forb communities with these associated sites occur on Cedar Mountain, as well as on the Manti-La Sal and Cache National Forests. Treatments implemented, which coincide with seeding, include excelsior and straw mulches, fertilizer and mycorrhizal applications, a soil conditioning adjuvant, and all their respective interactions.

### **Products:**

- (1) PhD dissertation at USU (Seth Ohms—2007).
- (2) Proposal presentation at the International meeting for the SRM - 2004
- (3) Publication of dissertation findings in relevant scientific journals.

### **Additional Research Questions:**

## **ESTABLISHING TALL FORB SEEDINGS – A HOLISTIC APPROACH.**

This smaller study is being conducted in conjunction with the study entitled “The restoration of degraded tall forb rangelands of the Intermountain West.” While presenting our research proposal and design at a tall forb symposium at the Society for Range Management’s 2004 national meeting in Salt Lake City, managers and scientists questioned whether costs to prepare the seedbed and cover the seed could be minimized by utilizing livestock hoof action, rather than mechanical tilling and seeding. At that time, no efforts directly related to tall forb reestablishment were known. Researchers involved with the Cedar Mountain Initiative quickly recognized the opportunity to research this topic at the Miners Peak study site (a degraded tall forb rangeland). Because the land is privately

owned and the livestock intensively managed, a study could be implemented in a timely manner. Presently, the effects of trampling by sheep on tall forb seeding success are being studied. The study includes plots that are seeded and trampled (unfenced), seeded and trampled (fenced), and seeded and non-trampled (fenced). The study design not only allows for identification of the effectiveness of the hoof action, but the ability of the tall forbs to reestablish under present livestock use. If sheep hoof action proves to be effective, it is hoped that an additional study can be implemented utilizing cattle.

**Other Funding Partners:**

Utah State University, Rocky Mountain Research Station (USDA-Forest Service, Logan), and the collaborating National Forests.

## **PUBLIC PERCEPTIONS REGARDING LIVESTOCK GRAZING AND WILDLIFE: A SURVEY OF STAKEHOLDERS IN THE INTERMOUNTAIN WEST**

### **Investigators:**

Terry Messmer, USU Extension Wildlife Specialist  
Mark Brunson, USU Department of Human Environment and Society  
Nan Romney, Research Assistant, College of Natural Resources  
Dean Mitchell, Utah Division of Wildlife Resources  
Dana Dolson, Utah Division of Wildlife Resources  
Sam Rowley, Utah Section of the Society of Range Management

### **Objectives:**

- (1) To identify stakeholder perceptions regarding livestock/wildlife interactions on rangeland.
- (2) To identify areas of conflict or concerns regarding livestock/wildlife interactions and determine potential sources
- (3) To identify information needs and research priorities regarding livestock/wildlife interactions.
- (4)

### **Methodology:**

We conducted a mail survey of public stakeholders that live in the Intermountain West to determine their perceptions, beliefs, and knowledge regarding livestock/wildlife interactions. The survey was mailed to 250 representatives of public and private conservation organizations, 200 randomly selected members of The Wildlife Society, Society for Range Management, Society for Conservation Biology, Farm Bureau, and National Cattlemen's Beef Association, and 1000 randomly selected households.

### **Results:**

Response rates for organizations and agencies exceeded 70%. Response rates for public survey was 40%. Cattlemen, Farm Bureau, and Society for Range Management members were more supportive of livestock grazing than other groups surveyed. Wildlife Society members recognized that livestock can be an important wildlife management tool. Conservation biologist and the general public recognize that grazing can be an important tool to manage wildlife habitats, but believed the application is currently limited.

### **Public Outreach, Presentations and Products:**

Presentation at 2001 Wildlife Society Meeting  
Manuscript is currently being prepared to report the results.

### **Future Activities:**

Survey results will be reported on the website.

### **Partners:**

Cedar Mountain Initiative, S.J. and Jessie Quinney Foundation, College of Natural Resources Quinney Professorship for Wildlife Conflict Management, Jack H. Berryman



## **THE ROLE OF SECONDARY COMPOUNDS IN ASPEN AND THEIR ROLE IN UNGULATE PREFERENCE**

### **Investigators:**

Damon Winter (USU)  
Dale L. Bartos (USDA-F. S.-Rocky Mountain Research Station and FRWS Dept. - USU, Logan)

### **Objective:**

To determine the variability of secondary compounds among western aspen clones and determine their influence on ungulate utilization.

### **Methodology:**

Aspen suckers will be analyzed to determine if differing levels of secondary compounds (defensive chemicals) exist among clones, and what the role of said chemicals are in regulating ungulate herbivory. Clones displaying both high and low levels of ungulate utilization within close proximity to one another will be identified (see photo). Root cuttings will be sampled from each clone and taken back to the lab in Logan for propagation. The resulting suckers will be analyzed for secondary compounds at various times throughout the growing season in order to determine secondary compound levels, relative to the growing season and nutrient availability. Statistical inference will be made regarding the role of these chemicals in ungulate selection based on the life history of the parent clone of each sucker (i.e. heavily utilized clone vs. avoided clone).

**Results:** Study will be started fall 2004

### **Products:**

- (1) M.S. thesis at USU (Damon Winter - 2006).
- (2) Publication of thesis
- (3) Publication in scientific journals
- (4) Possible protocol for managers to identify clones in need of protection from ungulate herbivory, in order to foster the regenerative success of clones after wildfire or treatments meant to induce regeneration in decadent clones

**Additional Research Questions:** Development of methodology for identifying aspen clones in need of protection from ungulate herbivory in order to promote the regenerative success of clones after wildfire, or treatments meant to induce regeneration in decadent clones.

### **Other Funding Partners:**

Utah State University and USDA-Forest Service-Rocky Mountain Research Station